HP NetServer LH 6000/LH 6000r
Service Manual

Online Version: 1.1

Last Updated: May 2000

Notice

The information contained in this document is subject to change without notice.

Hewlett-Packard makes no warranty of any kind with regard to this material, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose. Hewlett-Packard shall not be liable for errors contained herein or for incidental or consequential damages in connection with the furnishing, performance, or use of this material.

Hewlett-Packard assumes no responsibility for the use or reliability of its software on equipment that is not furnished by Hewlett-Packard.

This document contains proprietary information that is protected by copyright.
All rights are reserved. No part of this document may be photocopied,
reproduced, or translated to another language without the prior written consent
of Hewlett-Packard Company.

Intel® and Pentium® are registered trademarks of Intel Corporation. Pentium® II Xeon and Pentium® III Xeon are trademarks of Intel Corporation.

Windows NT® and Windows 95® are registered trademarks of Microsoft in the U.S. and other countries.

Torx® is a registered trademark of CamCar/Textron, Inc.

Hewlett-Packard Company
Network Server Division
Technical Communications/MS 45SLE
10955 Tantau Avenue
Cupertino, CA 95014 USA

© Copyright 2000, Hewlett-Packard Company.

Audience Assumptions

This guide is for the person who services LAN servers. Hewlett-Packard Company assumes you are qualified in the servicing of computer equipment and trained in recognizing hazards in products with hazardous energy levels and are familiar with weight and stability precautions for rack installations.

Contents

1 ..General Information 1

Notice to Service Technicians 1

Removing Covers - Pedestal LH6000 1

Removing Covers - Rack Mount LH6000r 3

Removing the System Board Assembly 7

Front View 9

Rear View 10

Lights and Indicators 10

Front Panel Console Switch and Indicator Descriptions 11

Indicators and Controls behind the LH 6000r Front Bezel 12

Hard Disk Drive LED Indicators 12

LEDs at the Rear of the Chassis 13

Main Menu 14

Viewing System Information 15

Event Log Menu 15

2 ..System Information 17

Boot Priority 17

IRQ Settings 17

Connector Pinouts 17

Video Connector Pinouts 17

Serial Port Connector 18

Parallel Port Connector 19

50-Pin Narrow SCSI Port Connector 19

Mini-DIN Connectors 20

Memory Guidelines 21

Mass Storage Guidelines 22

Accessory Board Guidelines 23

Hot Addition and Replacement of Hot Plug PCI Boards 23

Online Replacement, Hot Swapping, of a PCI Adapter 24

Remote Control (Top Tools) Board 24

HP NetRAID Guidelines 24

To disable SCSI A channel: 24
To configure the drive(s) in the hot-swap cage as a RAID array: 25
Processors Guidelines 25
Technical Specification 26
Video 26
Environment Specifications 27
Dimensions 27
Power Requirements 28
Switch Settings 28
System Board Assembly Illustration 30
System Board Illustration 30
I/O Board Illustration 31
Power Management/Interconnect Board Illustration 32
3. Parts Information 33
Exploded View - Covers, Bezel, Front Panel 33
Exploded View - Power Supply, I/O Board, Fans 34
Exploded View - Mass Storage 35
Exploded View - System Board Assembly 36
Exploded View - Exhaust Fans 37
Replaceable Parts List 38
Keyboards 41
Power Cords 41
Cabling Diagram 41
4. Diagnostics 43
Diagnostic Tests 43
Diagnostics Description 43
HP NetServer DiagTools 44
DiagTools Capabilities 44
Event Log Menu 45
POST Routines 46
Beep Codes 47
Error Messages 48
5. Troubleshooting 55

Preventive Maintenance Procedures 55
Troubleshooting Tips 55
General Troubleshooting Sequence 56
The System Will Not Power Up 57
The System Will Not Boot 57
Intermittent Failures 57
Clearing the System Configuration 57
Password Problems 59
BIOS Recovery 60
Troubleshooting Checklist 61
General System Problems 62
Memory Problems 64
CD-ROM Problems 65
Flexible Disk Drive Problems 66
Keyboard and Mouse Problems 67
Network Interface Card Problems 67
Power Problems 68
SCSI Subsystem Problems 69
Video/Monitor Problems 73
Configuration Problems 75
Verifying Hard Disk Drive Operation 76
Processor Problems 77
Printer/DataComm Problems 78

6. Replacing Parts 79

Safety Information 79
Service Tools Required 79
Replacing Power Supply Module(s) 79
Replacing the Control Panel 80
Replacing the HP NetRAID DIMM 81
Replacing the System Battery 82
Replacing the NetRAID Battery Backup Module (Optional) 84
Replacing System Memory 85
Replacing a Processor 88

Replacing a VRM....89
Replacing the Power Supply Fans....90
Replacing the Rear Chassis Fans....91
Replacing the I/O Fans....92
Replacing the Processor Fans....92
Replacing the Hot Swap Mass Storage Cage....94
Replacing the I/O Board....95
Replacing the Processor Board....97
Replacing the System Board....99
Replacing the Power Management/Interconnect Board....101
Replacing the PCI Hot-Swap Assembly....103

Index....105

1 General Information

Notice to Service Technicians

This is the service document for the HP NetServer LH6000 server. You also need to access the HP NetServer LH6000 Installation Guide which comes with the server and is also available on the Network Server Division WEB site and on the Information Assistant Documentation CD-ROM.

The LH6000 installation guide contains additional information on the installation process that the end users follow. Both documents are needed for complete servicing information.

Removing Covers - Pedestal LH6000

WARNING	Before removing covers, disconnect the power cords and unplug telephone cables. If possible, shut down the operating system. Disconnect the power cords to avoid exposure to high energy levels that may cause burns when parts are short-circuited by metal objects, such as tools or jewelry. Disconnect telephone cables to avoid exposure to shock hazard from telephone ringing voltages. Wear a grounded wrist strap and use a static-dissipating work surface when handling NetServer components. Note that the power switch does not turn off the standby power. Disconnect the power cords to turn off standby power.

NOTE	If the backlight of the LCD is on, standby power is also on.

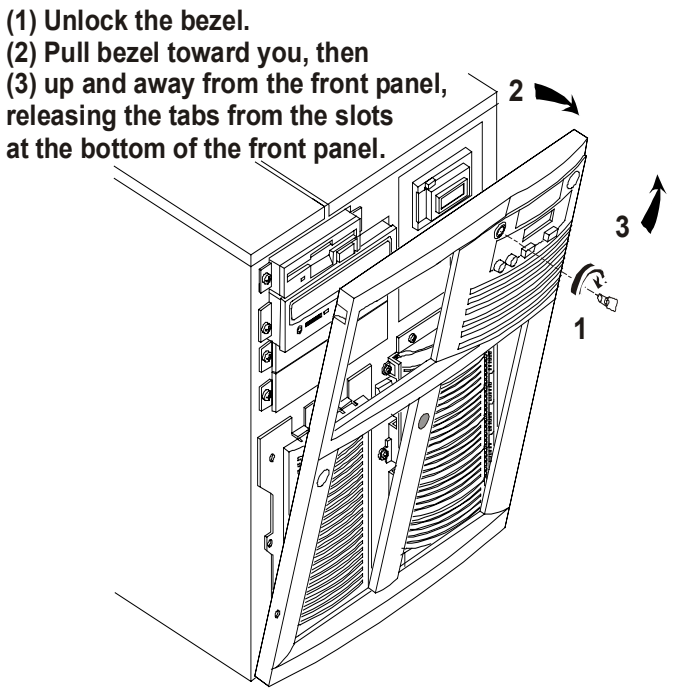
1. Unlock the bezel, using the supplied key.

   The bezel connects to the chassis with two snap-in connectors inside its top left and right corners and two tabs that fit into two slots on the bottom of the chassis.

2. Remove the bezel.

   a. Pull bezel toward you until it unsnaps.

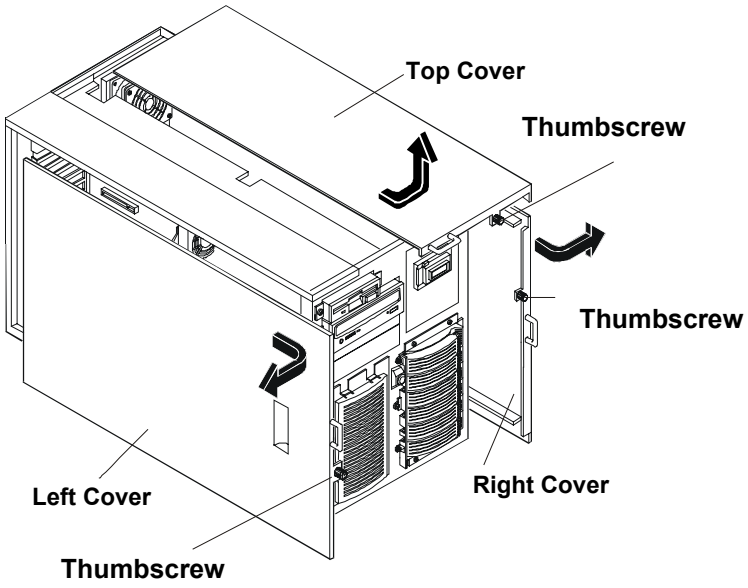
   b. Lift the bezel forward and upward from the chassis face.


(1) Unlock the bezel.
(2) Pull bezel toward you, then
(3) up and away from the front panel,
releasing the tabs from the slots
at the bottom of the front panel.
2
3
1

Removing the HP NetServer LH 6000 Bezel

CAUTION	The NetServer covers are heavy. Support them as you remove them, and allow room to move them away from the NetServer and for storage when removed.

3. Once you have removed the bezel, remove the left cover by loosening the thumbscrew and then pulling the cover forward to disengage it. Lift it outward and away from the chassis.
4. Remove the top cover by loosening the thumbscrew, pulling the cover forward and then slightly sideways to disengage it. Lift it up and away from the chassis.
5. Remove the right cover by loosening the thumbscrew and pulling the cover forward to disengage it. Lift it outward and away from the chassis.



HP NetServer LH 6000 Covers

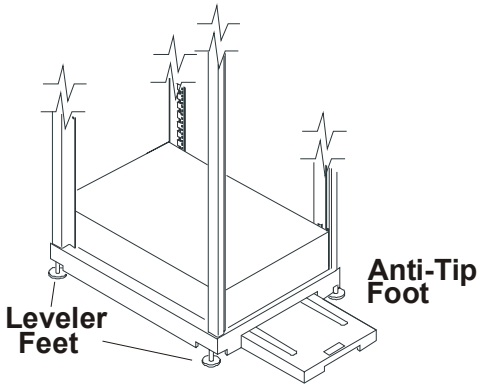
Removing Covers - Rack Mount LH6000r

WARNING	Before removing covers, disconnect the power cords and unplug telephone cables. If possible, shut down the operating system. Disconnect the power cords to avoid exposure to high energy levels that may cause burns when parts are short-circuited by metal objects, such as tools or jewelry. Disconnect telephone cables to avoid exposure to shock hazard from telephone ringing voltages. Wear a grounded wrist strap and use a static-dissipating work surface when handling NetServer components. Note that the power switch does not turn off the standby power. Disconnect the power cords to turn off standby power.

NOTE	If the backlight of the LCD is on, standby power is also on.

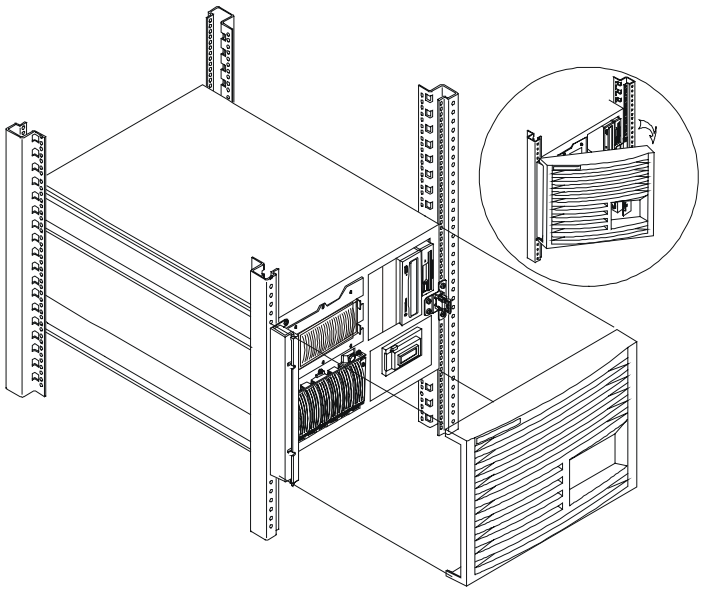
1. Extend the anti-tip foot from under the front of the rack.

WARNING	This anti-tip device must be extended to prevent the rack and NetServer from tipping over, which could damage the NetServer and injure people.



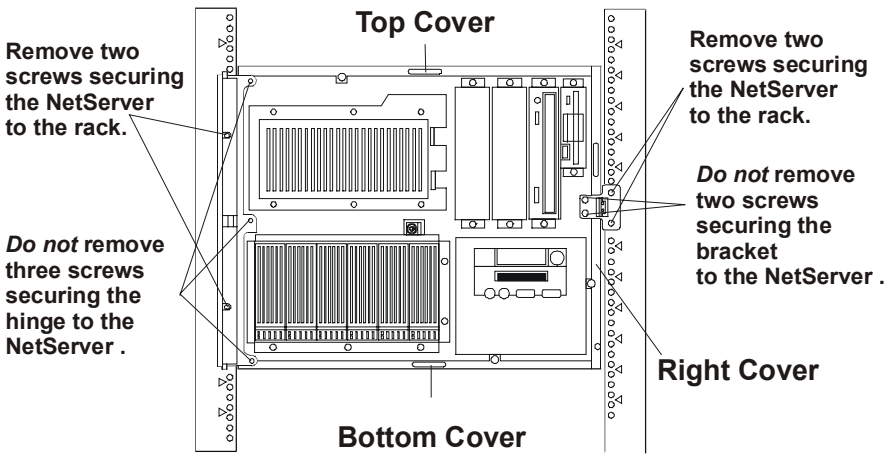
Rack Anti-tip Foot

2. Remove the bezel from the front of the HP NetServer by swinging the bezel open (past 90 degrees) until it releases from the three posts on the bezel hinge.

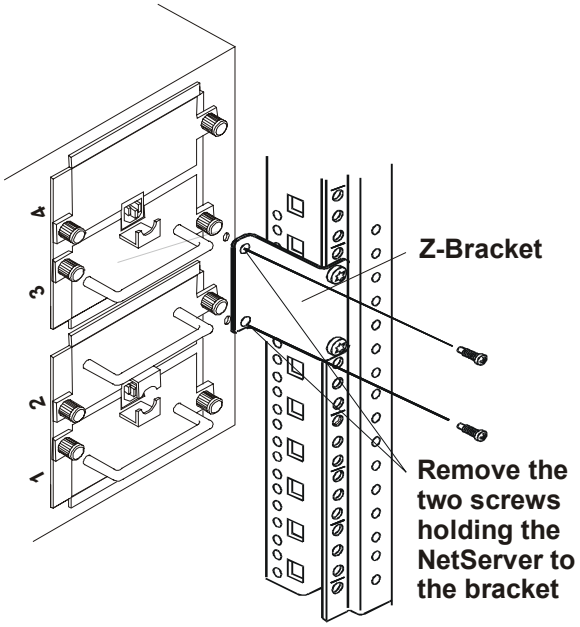


Removing the HP NetServer LH 6000r Bezel

3. Use a Torx 15 screwdriver to unscrew the four screws securing the HP NetServer to the rack.
4. Do not unscrew the entire hinge or bracket from the HP NetServer. Remove only the outer screws so the hinge and the bracket remain attached to the HP NetServer chassis.

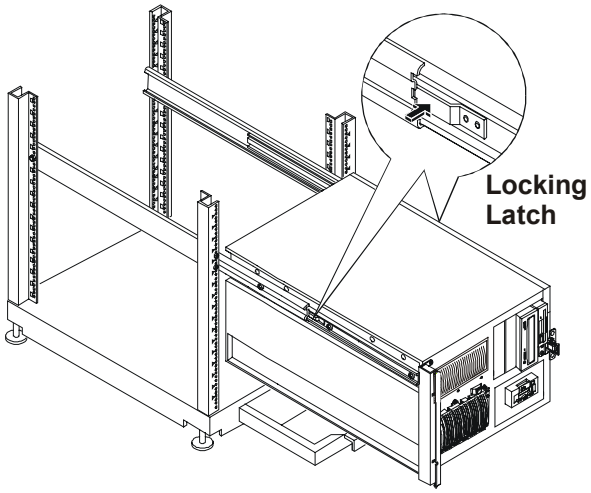

Top Cover
Remove two screws securing the NetServer to the rack.
Remove two screws securing the NetServer to the rack.
Do not remove two screws securing the bracket to the NetServer .
Do not remove three screws securing the hinge to the NetServer .
Right Cover
Bottom Cover

Front of LH 6000r Screw and Cover Locations



Remove Z-bracket

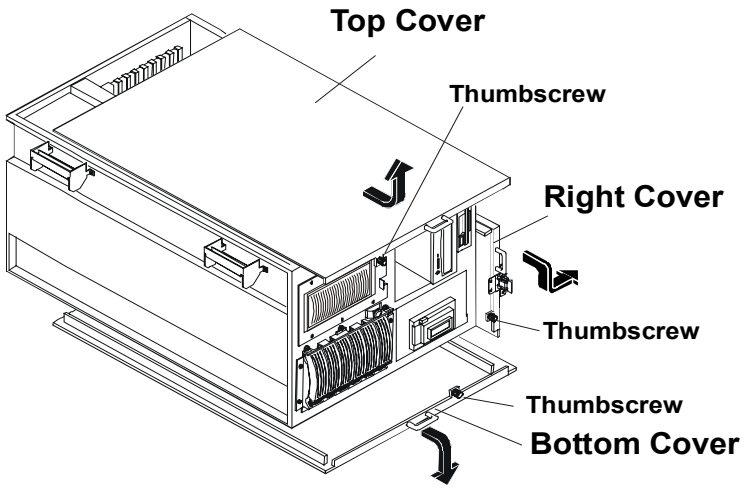
5. The Z-bracket is used only during shipment to secure the HP NetServer to the rack. To remove the Z-bracket, remove the two screws that connect the Z-bracket to the column at the rear of the HP NetServer. Save the Z-bracket for future use.
6. At the front of the HP NetServer, pull the NetServer forward from the rack until you hear the lockout device engage with a click.



Locking Latch

CAUTION	The HP NetServer covers are heavy. Support them as you remove them, and allow room to move them away from the HP NetServer and for storage.

7. Remove the Top Cover by loosening the thumbscrew and sliding the cover forward to disengage it. Lift it up and away from the chassis.



HP NetServer LH 6000r Covers

8. Remove the Right Cover by supporting it with your hand, then loosening the thumbscrew and pulling the cover forward to disengage it. Lift it away from the chassis.
9. Remove the Bottom Cover by supporting it with your hand, and loosening the thumbscrew with the other hand. Pull the cover forward to disengage it and catch it as it falls away from the chassis.

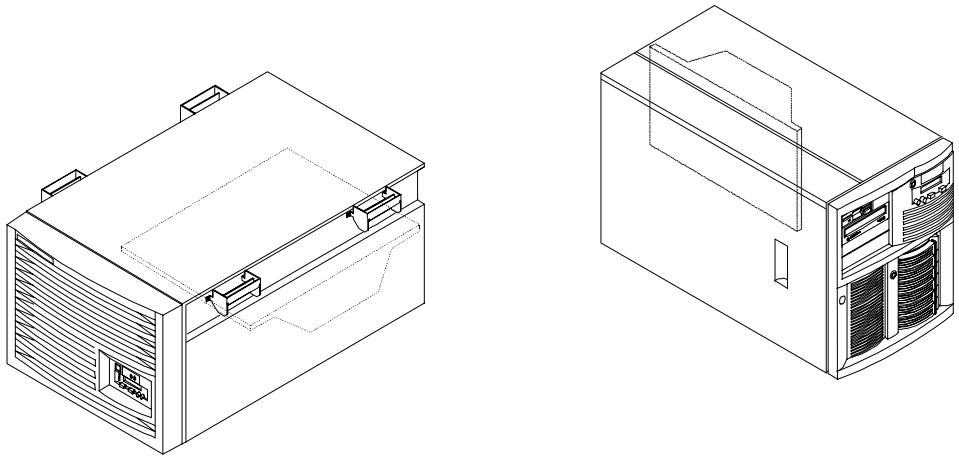
Removing the System Board Assembly

CAUTION	Extend the anti-tip foot prior to any work on a rack-mount server.

1. Log off all users and gracefully shut down the network operating system according to directions in your NOS documentation.
2. Power down the HP NetServer.
3. Disconnect the power cords and cables, and if necessary, label each one to support re-assembly.

CAUTION	The power supplies will continue to provide standby current to the NetServer until the power is disconnected.

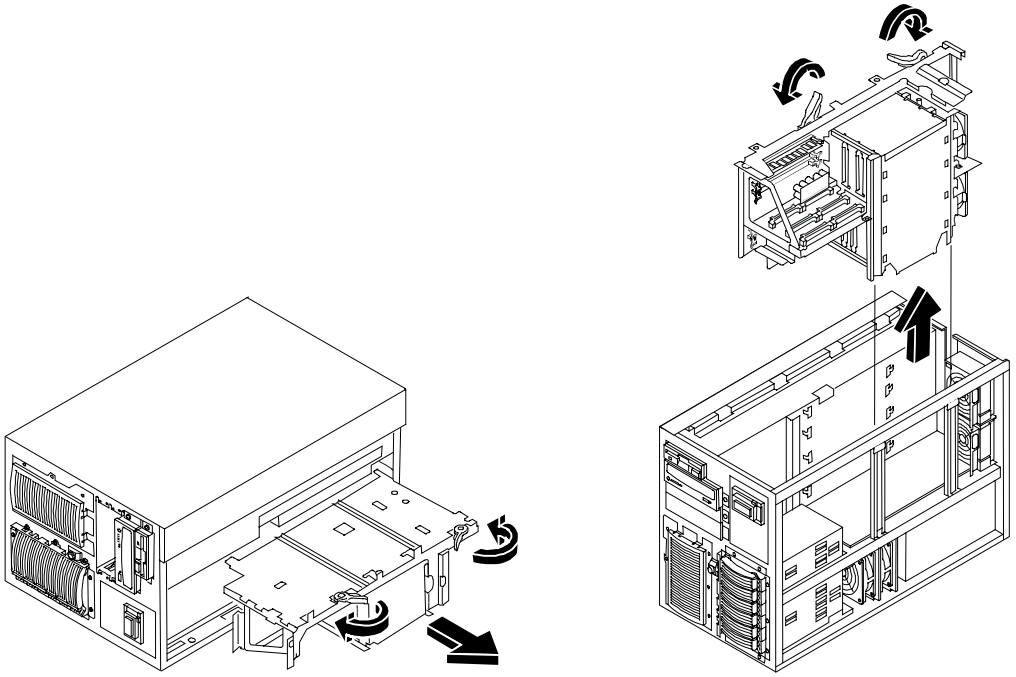
4. Follow the instructions in removing the covers to gain access to the system board assembly.



Location of System Board Assembly

WARNING	Always disconnect the power cords before removing the covers, to avoid exposure to high energy levels that may cause burns when parts are short-circuited by metal objects such as tools or jewelry. Disconnect any telephone cables to avoid exposure to shock hazard from telephone ringing voltages.

5. Unlatch the blue retaining latches to release the board.



Removing the System Board Assembly

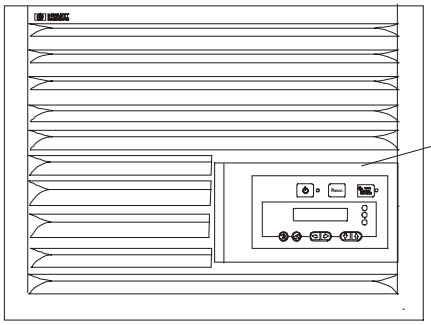
CAUTION	The system board assembly weighs approximately 20 lbs. (9 kgs.). Removing the board assembly with the assistance of another person is advised.

6. Pull the board out until it clears the chassis guides.
7. Slide the system board assembly from the chassis and place it metal plate side down on an anti-static pad.

CAUTION	Do not operate the HP NetServer for more than sixty minutes without first installing all covers and the front bezel. Operating the system without all covers in place reduces critical cooling airflow over some components, such as hard disk drives and processors. Operating the system without all covers in place may result in failure of these components.

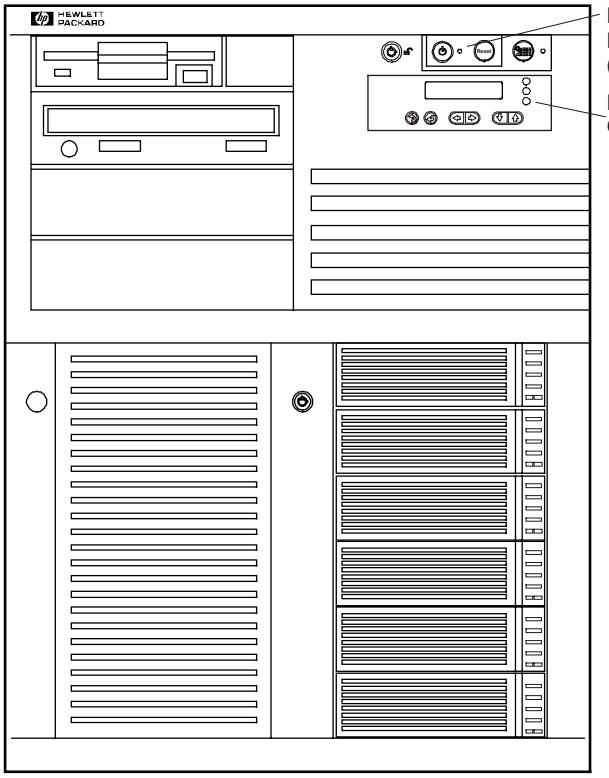
Front View

Front of LH6000r Chassis



LH 6000r Bezel and Front Panel Console

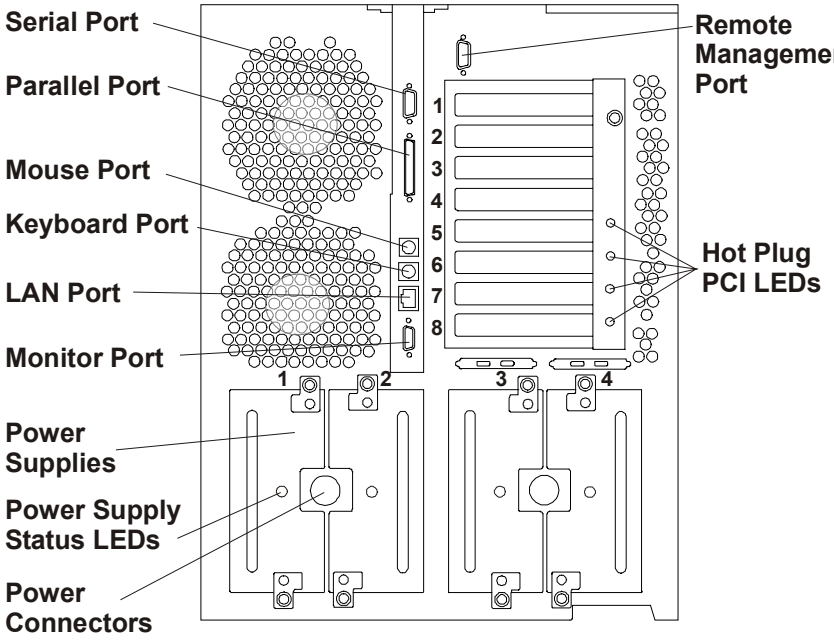
Front of LH6000 Chassis



LH 6000 Bezel and Front Panel Console

Rear View

The HP NetServer's rear panel includes communication ports, the AC power connectors, and the HP NetServer's two power supplies cages. The four hot plug PCI slots LEDs are above power supply 4.

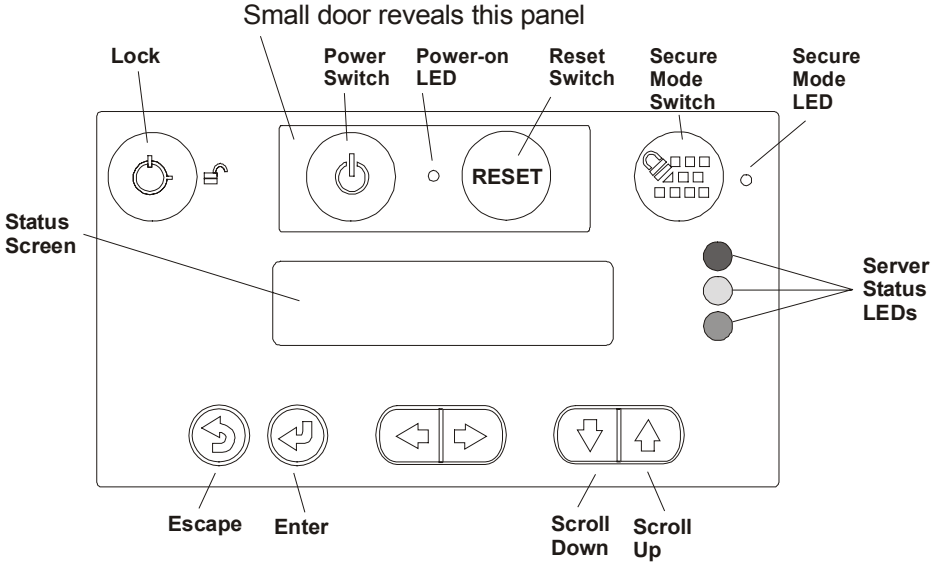


Rear Panel of the HP NetServer

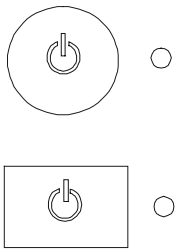
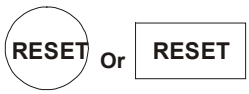
The optional Redundancy Kit provides a fourth power supply. Since the HP NetServer requires three power supplies to run, a fourth power supply helps to prevent service interruptions. With the Redundancy Kit installed, a power supply can be hot-swapped.

Lights and Indicators

This is the HP NetServer **LH 6000's** Front Panel Console (**LH 6000r** is similar, but has no lock).

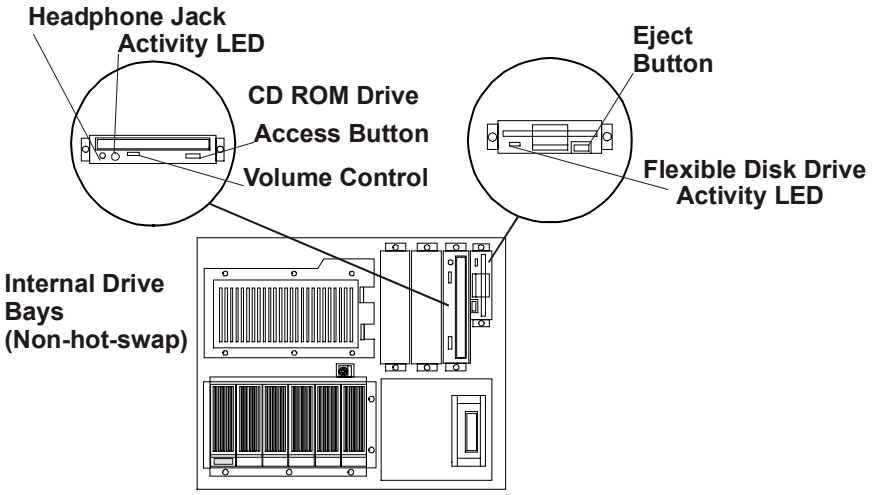


Front Panel Console Switch and Indicator Descriptions

Control	Description
DC Power Switch and LED 	Turns the HP NetServer on and off. This switch is under the door on the front panel. Push once to turn on, again to turn off. As long as the AC power is connected to the HP NetServer, standby power is present. • If the LED is steady green, then the HP NetServer is powered-up. • If the LED is flashing green, the HP NetServer is in a power-save mode. • If the LED is off, but the two-line display has a message, standby power is present. • To go into power-save mode, depress the power switch; you must press it for over ten seconds to effect a power down.
	Resets the HP NetServer. This switch may be disabled by Secure mode.
Secure Mode Switch and Indicator	Locks system keyboard, monitor display, and control panel to prevent unauthorized use. Go to the Setup utility security menu to configure this feature. Secure Mode indicator illuminates when Secure Mode is enabled.
Status screen	Reports system status.

Red LED	Yellow LED	Green LED	Indicates HP NetServer Status:
Off	Off	Off	Main power is off and the HP NetServer may or may not be on standby power.
Flashing	Off	Off	Immediate attention required due to a failed component in the HP NetServer. The HP NetServer may not be fully operational, due to this condition, such as POST errors.
Off	Flashing	Off	Attention required due to a pre-failure condition. This condition may be caused by a component failure (for example, a redundant fan or power supply) that could lead to a critical component failure, such as a processor module exceeding its operating temperature. If the failed component is redundant, the HP NetServer may still be operating normally.
Off	Off	On	The HP NetServer is operating normally.

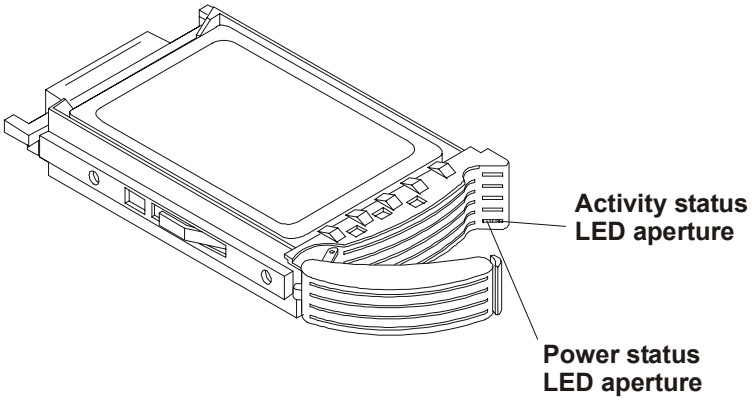
Indicators and Controls behind the LH 6000r Front Bezel



CD-ROM, Flexible Disk Drive, and HDD LEDs

Hard Disk Drive LED Indicators

Each hot-swap hard disk drive module has to LED apertures on its front, one for power status and one for activity status. Light pipes on the module transmit light to these apertures from LEDs on the inside rear of the hot-swap mass storage cage.



LED Apertures on Hot-Swap Hard Disk Drive Module

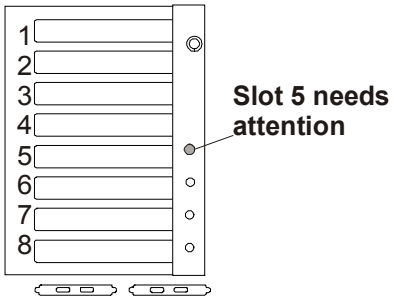
NOTE	The Activity LED for a drive flashes green when the drive is accessed.

Status LED	Condition
Red Fast Flashing	Drive Fault
Amber Normal Flashing	Drive Failure Predicted
Green Solid	Drive Present and Normal
Red Solid	12V Fault

LEDs at the Rear of the Chassis

PCI Attention LEDs

If a hot plug board needs attention, its LED glows amber.

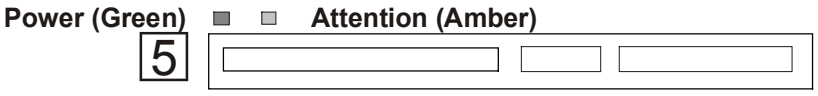


Amber Attention LED

When an amber PCI LED appears, you must remove the cover to see the internal PCI Power LEDs for each hot plug PCI slot.

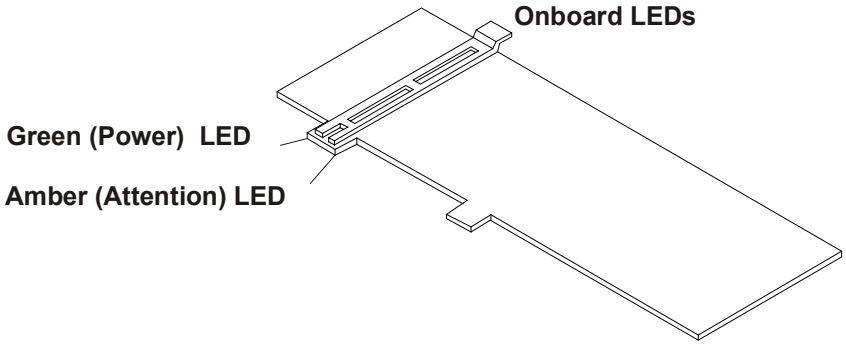
PCI Power LEDs (Internal)

Four pairs of very small LEDs are on the I/O board above left of each hot plug PCI slot.



Onboard LEDs

The light from the small onboard LEDs is visible through the light pipes on the plastic slot separators.



Light Pipes Display PCI LEDs

PCI Hot Plug LEDs (Internal)

Amber	Green	Status Indicated	Your Action
Off	On	Power to the slot is on, and the slot is operating normally.	Do not remove the board from the slot.
On	On	The slot needs attention, but power to the slot is on.	Do not remove the board from the slot.
On	Off	The slot needs attention, but power to the slot is off.	You can safely remove the board from this slot.
Off	Off	Power to the slot is off.	You can safely remove the board from this slot.

Power Supply LEDs

Interpret the green LEDs on the power supplies in this way:

Green LED	Indicates this HP NetServer Status:
Steady Green	The system is powered up.
Flashing	The system is in stand-by or power-save mode.
Off	The AC line is unplugged or the power supply has failed.

LAN LEDs

The LH 6000 has two LEDs on either side of the RJ-45 connection. Interpret the LEDs in this way:

Local Area Network LED Status

Green LED	Yellow LED	LAN Status:
On/Flashing	Off	The LAN is connected and data is being transferred at 10Mbps.
On/Flashing	On	The LAN is connected and data is being transferred at 100Mbps.
Off	Off	The LAN is not connected or is not operational.

Main Menu

This is the status screen default display for the LH 6000:

```
HP NetServer
LH 6000
```

1. To reach the main menu from this default screen, press the **Enter** button.

NOTE The status screen displays two lines of an entire menu at a time.

This is the entire Main Menu:

```
***Main Menu****

>Event Log
>FW Info
>System Info
>Component Info
>Service
>Adjust Contrast
```

Menus beginning with a greater-than symbol (>) indicate sub-menu selections.

2. Use the arrow buttons to move the cursor to your selection and press the Enter button.

   A cursor highlights the currently selected line.

3. To return to the Main Menu from one of these selections, press **Escape**.
4. To exit the Main Menu, press **Escape**.

Viewing System Information

Use the HP NetServer's status screen and buttons to view system configuration information, a log of current and past conditions, replaceable parts information, adjust screen contrast, and more.

Front Panel Console Buttons

Button Name	Description
Escape	Return to a previous menu
Enter	Select an item from a menu.
Down Arrow	Scroll down one line through the current screen or menu.
Up Arrow	Scroll up one line through the current screen or menu.
Left Arrow	Adjust contrast (when adjust contrast menu selected)
Right Arrow	Adjust contrast (when adjust contrast menu selected)

NOTE The buttons and menus operate when the HP NetServer has powered down or hung, as long as the NetServer is plugged in. During POST (power-on self-test) the buttons and menus are disabled temporarily so that the status screen can display POST and boot messages.

Event Log Menu

The Event Log menu has information about current and resolved events. The menu provides a list of all events currently in the log. These may be errors, or normal system events like a system boot.

NOTE You can view system events in the status screen and in the Event Log Report Utility in NetServer Utilities on Navigator. The details may differ slightly.

2 System Information

Boot Priority

Some boards have preferred slot locations. Consider the boot order when choosing the accessory board slot in which to install the accessory board.

This is the default boot priority for the LH 6000/6000r:

1. IDE CD-ROM drive with a bootable CD-ROM
2. Flexible disk drive with a bootable flexible disk
3. HP NetRAID controller or integrated Embedded SCSI controller
4. PCI boards in slots in the following order: 8, 7, 6, 5, 4, 3, 2, and 1

Change this boot order using the Setup utility.

IRQ Settings

The BIOS automatically assigns the IRQs (hardware interrupts) for each PCI slot and embedded device in the HP NetServer during boot. These assignments trigger the NOS to enable the APIC (Advanced Programmable Interrupt Controller). APIC takes advantage of the expanded set of non-conflicting IRQs for those accessory boards requiring more than one IRQ per slot. APIC provides up to four dedicated interrupts for each PCI slot.

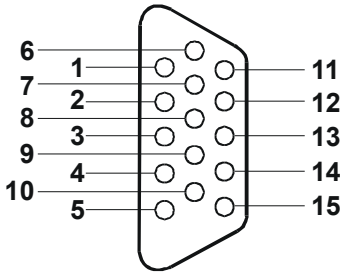
These automatic IRQ assignments can be changed in the setup screen (F2).

Connector Pinouts

Unless otherwise noted, the following features apply to all models. Some features are factory installed; others are optional.

Video Connector Pinouts

The built-in video uses the standard 15-pin analog display pinout configuration. The pinouts for your monitor may vary. For the pinouts for your monitor, refer to the manual that came with your monitor.

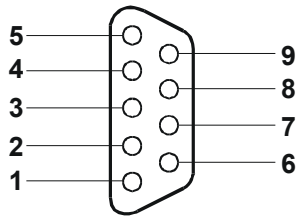


Video Connector Pinouts

Video Connector Pinouts

Pin Number	Function	Pin Number	Function
1	Red	9	Key (no pin)
2	Green	10	Sync return (ground)
3	Blue	11	Monitor ID bit 0
4	Monitor ID bit 2	12	Monitor ID bit 1
5	Monitor self test (ground)	13	Horizontal sync (+)
6	Red return (ground)	14	Vertical sync (-)
7	Green return (ground)	15	Not used
8	Blue return (ground)		

Serial Port Connector

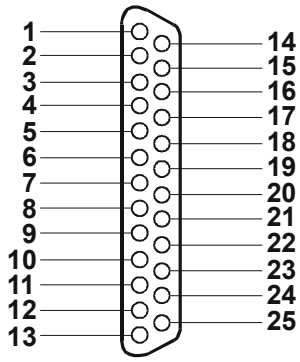


Serial Port Connector Pinouts

Serial Port Connector Pinouts

Pin Number	Signal Description
1	Data carrier detect
2	Receive data
3	Transmit data
4	Data term ready
5	Signal ground
6	Data set ready
7	Request to send
8	Clear to send
9	Ring indicator

Parallel Port Connector



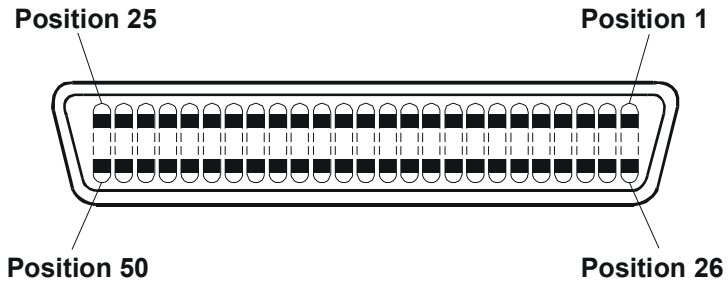
Parallel Connector Pinouts

Parallel Port Connector Pinouts

Pin Number	Signal Description	Pin Number	Signal Description
1	Strobe5	10	Acknowledge[b]
2	Data bit 06	11	Busy
3	Data bit 1[a]	12	Paper end
4	Data bit 2[a]	13	Select
5	Data bit 3[a]	14	Auto line feed[b]
6	Data bit 4[a]	15	Error1
7	Data bit 5[a]	16	Initialize printer[b]
8	Data bit 6[a]	17	Select in[b]
9	Data bit 7[a]	18-25	Signal ground

a. All data bits are sent to a printer in an 8-bit parallel format.
b. The signal is active low.

50-Pin Narrow SCSI Port Connector



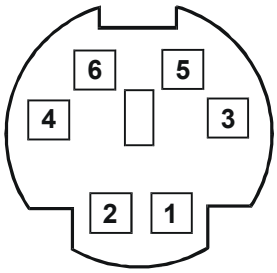
SCSI Port Connector Pinouts

50-Pin Narrow SCSI Port Connector Pinouts

Pin Number	Signal Description	Pin Number	Signal Description
1-11	Ground	37	Reserved
12	Reserved	38	Termpwr
13	Open	39	Reserved

Pin Number	Signal Description	Pin Number	Signal Description
14	Reserved	40	Ground
15-25	Ground	41	-ATN
26	-DB(0)7	42	Ground
27	-DB(1)	43	-BSY
28	-DB(2)	44	-ACK
29	-DB(3)	45	-RST
30	-DB(4)	46	-MSG
31	-DB(5)	47	-SEL
32	-DB(6)	48	-C/D
33	-DB(7)	49	-REQ
34	-DB(P)	50	-I/O
35-36	Ground		

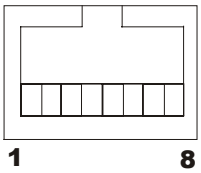
Mini-DIN Connectors



Mini-DIN Connector Pinouts for the Mouse and Keyboard

Mini-DIN Connector Pinouts for the Mouse and Keyboard

Pin Number	Signal Description
1	Data signal
2	Not used
3	Ground
4	Power (+5 V dc)
5	Clock signal
6	Not used

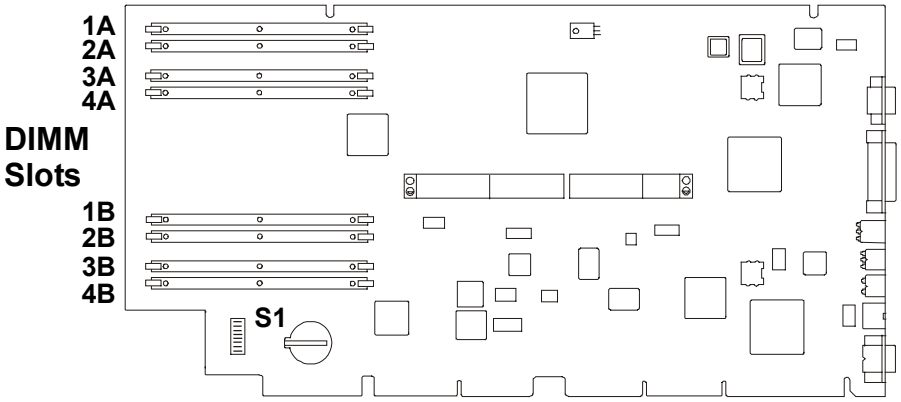


LAN Connector

LAN Connector Pin Number	Signal Description
1	Data signal
2	Not used
3	Ground
4	Power (+5 V dc)
5	Clock signal
6	Not used

Memory Guidelines

The standard memory configuration is 256 MB of interleaved memory, one 128 MB DIMM in socket 1A and one 128 MB DIMM in socket 1B. Expansion is accomplished by adding pairs of equal size DIMMs in stipulated slots up to the maximum configuration of 8 GB.



DIMM slots on System Board

- Add paired DIMMs of these sizes:
  - ◊ 128 MB
  - ◊ 256 MB
  - ◊ 512 MB
  - ◊ 1 GB
- Memory of equal size must be added in pairs.
- You can mix DIMM sizes. For example, you may place a 1 GB DIMM pair next to a 128 MB DIMM pair.
- Add paired memory in any order to the eight slots.

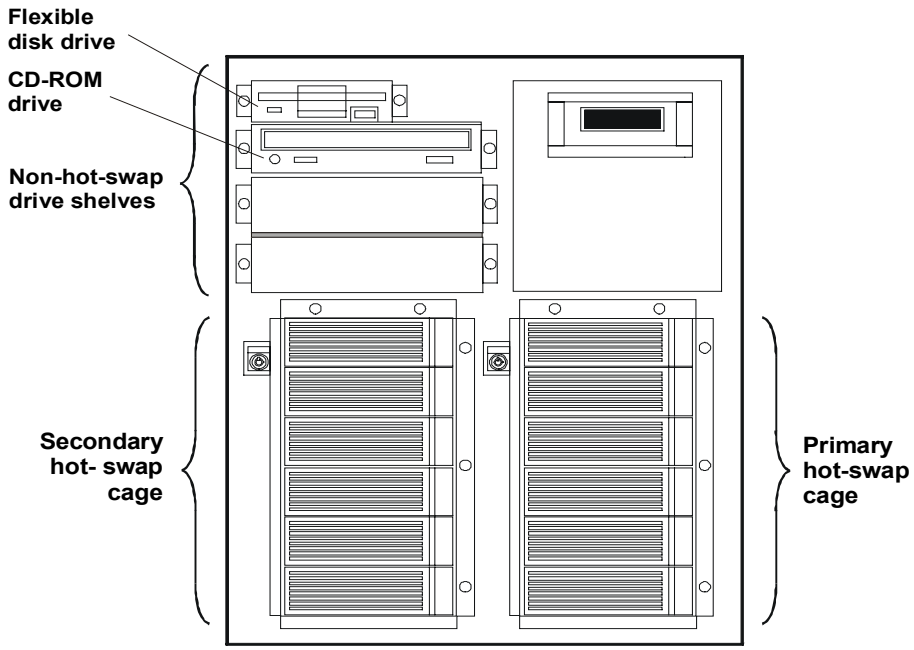
- Maximum configuration is 8 GB.
- Do not rock the DIMM into place, but apply firm and even pressure until it is seated in the socket.
- Use only HP-supported DIMMs.

The installation procedure is the same for the rack-mount and the pedestal HP NetServers once you gain access to the system board assembly. While you can perform memory installation in the rack or in the pedestal, it is recommended that you remove the system board assembly in order to install components. If you install memory without removing the system board assembly, the DIMM slots region of the system board is accessible when the bottom cover of the LH 6000r is removed and the left cover of the LH 6000 is removed.

CAUTION	Wear a wrist-strap and use a static-dissipating work surface connected to the chassis when handling components. Ensure the metal of the wrist strap contacts your skin.

Mass Storage Guidelines

This HP NetServer has a flexible mass storage system. You can install up to six hot-swap devices in the primary hot-swap mass storage cage and you can install an additional six hot-swap devices in the optional, secondary cage.



The mass storage system includes several standard pre-installed devices:

- A flexible disk drive is installed in Shelf 1.
- An IDE CD-ROM drive is installed in Shelf 2.
- A single hot-swap Ultra-2 SCSI hard disk drive is installed in the primary hot-swap mass storage cage.

The HP NetServers support two classes of mass storage devices:

- Non-hot-swap, single-ended SCSI devices installed in the two empty trays adjacent to the CD-ROM drive
- Hot-swap Ultra-2 SCSI hard disk drives installed in the hot-swap mass storage cages

Use only high-performance, Ultra-2, hot-swap drives in the integral hot-swap mass storage cages.

You can add any Ultra/Wide, single-ended SCSI device in the non-hot-swap shelves, such as a removable hard disk or a tape backup drive. This table lists supported SCSI devices:

Location	Drive Type
Hot-swap Mass Storage Shelves	9.1, 18.2 or 36 GB, Ultra-2, 7200 or 10000 rpm drives (up to 35W)
Non-Hot-Swap Shelves	9.1 or 18.2 GB Ultra/Wide or Single-Ended SCSI Drives, 7200 or 10000 rpm drives
	DAT backup systems with SCSI DDS3, or DLT Tape Drives

Accessory Board Guidelines

To install accessory boards, during initial installations, into the I/O board, perform the following procedures. The I/O board is under the top cover of the LH 6000r and under the left cover of the LH 6000.

- Use the respective NOS software utility to
  - ◊ Ensure the correct software drivers for the PCI board are loaded
  - ◊ Verify correct operation
  - ◊ Shut down power to hot plug slots

CAUTION	Do not attempt to install or remove non-hot plug PCI boards with the HP NetServer in any kind of sleep state, or a system crash or hang may occur.

- Slots 1, 2, 3, and 4 are non-hot plug; slots 5, 6, 7, and 8 are hot plug.
- For optimal performance, add PCI boards to slots 7 and 8, which at 66 MHz and 64 bit, are the fastest.
- Consider the boot priority prior to installing accessory boards, but after configuring the HP NetServer.
- Some accessory board outputs may exceed U.S. National Electrical code (NFPA 70) Class 2 or power source limits and must use appropriate interconnecting cabling in accordance with the National Electrical Code. (All Hewlett Packard boards comply with Class 2.)
- You can configure the HP NetServer to boot from a PCI-based DAC inserted into a PCI slot. Use the Symbios Configuration Utility to select a different PCI slot when scanning for boot devices.
- Slots 7 and 8 accept universal boards. Universal boards automatically switch to accept power from a +5.0 or +3.3 VDC.

Hot Addition and Replacement of Hot Plug PCI Boards

The PCI Hot Plug option is NOS-dependent. To use the Hot Plug option, the PCI board must have a hot plug compliant driver and a Hot Plug Utility for the respective NOS. The Hot Plug Utility is used to turn power off/on to the PCI slot, while the HP NetServer continues to operate normally.

NOTE	Hot Removal or online deletion of an adapter board and reconfiguring of that adapter from the HP NetServer is not supported.

Refer to the PCI Hot Plug Replacement procedures in *HP NetServer Navigator CD-ROM* for the NOS you are using.

Online Replacement, Hot Swapping, of a PCI Adapter

NOTE	You can Hot Swap an adapter only if it is the passive adapter, or inactive adapter of a fault-tolerant pair.

For more current PCI Hot Plug information and PCI Hot Plug drivers, go to:

http://www.hp.com/cposupport/

Select your product and download the latest software. PCI hot plug drivers are in the SCSI section.

Remote Control (Top Tools) Board

The HP Remote Control board supports HP TopTools software and comes installed from the factory in PCI slot 2, due to its boot order (Bus 5) and a required cable connection to the I/O board. The I^2C cable for the HP TopTools Remote Control card is inserted into connector J1F1 on the I/O board.

HP NetRAID Guidelines

This HP NetServer contains an embedded dual-channel RAID controller, which puts the power of the HP NetRAID series of disk array controllers in the HP NetServer.

HP NetRAID technology lets you link multiple hard disk drives together to provide faster access and/or increased data reliability. With the embedded RAID controller, you can configure your linked drives as RAID (Redundant Array of Independent Disks).

Disk drives in the hot-swap mass storage cage may be used as either standard mass storage, or configured together as a RAID array.

This HP NetServer is shipped with SCSI A channel enabled as a RAID channel, and the included hot-swap drive is not configured. You can either disable SCSI A channel as a RAID channel, or configure the drive(s) in the hot-swap cage as a RAID array.

To disable SCSI A channel:

- Exclude SCSI A channel from the embedded RAID controller, as follows:
  1. Restart the HP NetServer.
  2. When you see the message "Press **[F2]** to enter SETUP" on the monitor, press the **[F2]** function key.
  3. When the Setup Utility menu appears, use the up and down arrow keys to highlight "Included SCSI A Channel **Yes]**."
  4. Use the +/- keys to change it to "Included SCSI A Channel **[No]**."
  5. Press the F10 function key to save and exit.
  6. Answer "Yes" to the question, "Save configuration and exit now?" The HP NetServer will start up again, and HP Navigator will restart.

To configure the drive(s) in the hot-swap cage as a RAID array:

- Run HP NetRAID Assistant to configure one or more RAID logical drives. Select "Execute" on the Configure Disk Array screen to start the HP NetRAID Assistant.

Refer to the *Integrated HP NetRAID Controller Configuration Guide* for further configuration information.

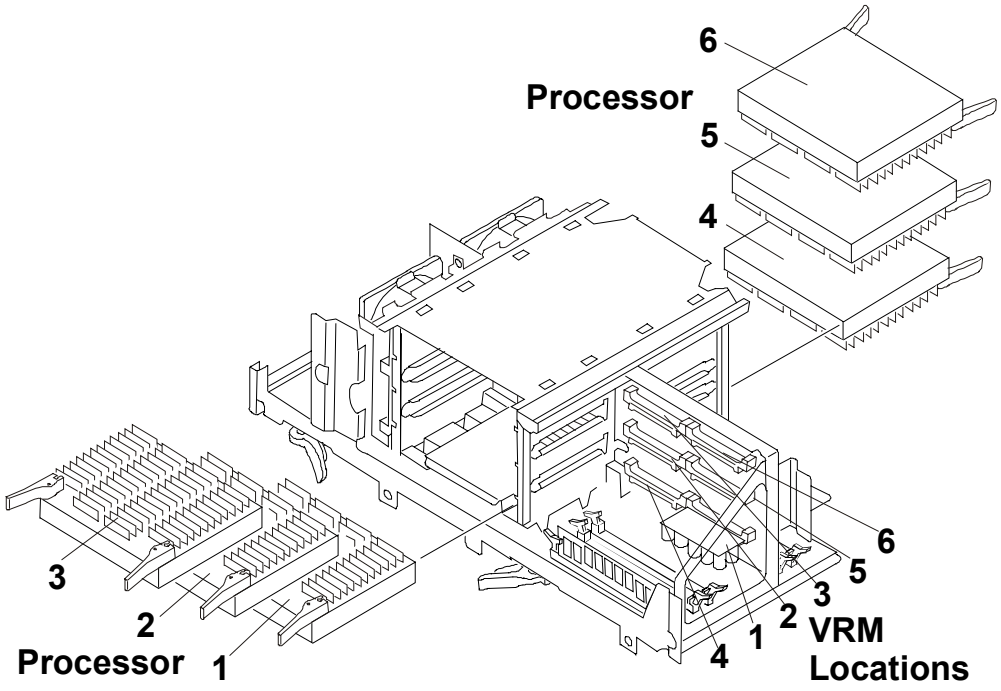
Processors Guidelines

The installation procedure is the same for the rack-mount and the pedestal HP NetServer once you gain access to the system board assembly

Configuration Switches S1-S4 – CPU Speed

Speed	Switch 1	Switch 2	Switch 3	Switch 4
550 MHz	ON	OFF	OFF	OFF
600 MHz	OFF	ON	ON	ON
650 MHz	OFF	ON	ON	OFF
700 MHz	OFF	ON	OFF	ON
750 MHz	OFF	ON	OFF	OFF

NOTE Not all processor speeds are supported.



Processor and VRM Locations

Technical Specification

The specifications listed below vary if you install a mass storage device in your server that has more stringent environmental limits. Make sure that the operating environment for your server is suitable for all the mass storage devices that you are using.

Video

Your HP NetServer is equipped with built-in video support provided by an ATI Rage II C controller. The video memory used for the HP NetServer LH 6000 or HP NetServer LH 6000r is a 16Mbit (2MB) SGRAM, with architecture of 256K x 32 bit x 2 banks.

Resolution	Rate @ 256 Colors	Rate @ 65K Colors	Rate @ 16.7M Colors	Rate @ True Color
640 x 480	60, 72, 75, 85, 90, 100, 120,160, or 200 Hz	60, 72, 75, 85, 90, 100, 120,160, or 200 Hz	60, 72, 75, 85, 90, 100, 120,160, or 200 Hz	60, 72, 75, 85, 90, 100, 120,160, or 200 Hz
800 x 600	47, 56, 60, 70, 72, 75, 85, 90, 100, 120,160, or 200 Hz	47, 56, 60, 70, 72, 75, 85, 90, 100, 120,160, or 200 Hz	47, 56, 60, 70, 72, 75, 85, 90, 100, or 120 Hz	47, 56, 60, 70, 72, 75, 85, 90, 100, or 120 Hz
1024 x 768	43, 60, 70, 72, 75, 85, 90, 100, 120,140, or 150 Hz	43, 60, 70, 72, 75, 85, 90, 100, 120,140, or 150 Hz	not supported	not supported
1152 x 864	60, 70, 75, 80, 85,100, or 120 Hz	43, 47, 60, 70, 75, 80, 85, 100, or 120 Hz	not supported	not supported
1280 x 1024	43, 47, 60, 70, 74, 75, 85, 90, or 100 Hz	not supported	not supported	not supported
1600 x 1200	52, 58, 60, 66, 70, 75, or 76 Hz	not supported	not supported	not supported

3D Video Modes

At 2 MB of SGRAM, the LH 3000 supports these video resolution configurations.

Resolution	Color Depths
512 x 384	16 bits
640 x 480	16 bits

NOTE The 65K color is equivalent to 16 bits, true color is 32 bits. Final resolution for the display depends upon capabilities of the embedded video and the monitor. Check the specifications supplied by the monitor manufacturer for refresh rates at the various resolutions.

Environment Specifications

Temperature

Operating	56° to 35° C (41° to 95° F)
Non-operating	-40° to +65° C (-40° to +149° F)

Humidity

Operating	20% to 80% relative humidity, non-condensing
Non-operating	5% to 95% relative humidity, non-condensing

Altitude

Operating	-30 to 3,045 m (~ 10,000 ft)
Non-operating	-30 to 12,180 m (~ 40,000 ft)

Acoustic Emissions

Sound level (LpA): < 58 dBA

Dimensions

Minimum Clearance

HP NetServer LH 6000

Front	1 m (39 inches)
Sides	2.5 cm (1 inch)
Top	2.5 cm (1 inch)
Back	15 cm (6 inches)

HP NetServer LH 6000r

Front	1 m (39 inches)
Sides	2.5 cm (1 inch)
Top	2.5 cm (1 inch)
Back	15 cm (6 inches)

Weight and Dimensions

NOTE A fully loaded HP NetServer can weigh up to 173 pounds. Follow local regulations, and use one person for every 40 pounds of HP NetServer weight when lifting it.

HP NetServer LH 6000

Height	494.8 mm (19.5 in)
Width	350.5 mm (13.8 in)

Depth	724.2 mm (28.5 in)
Weight	72.6 – 78.5 kg (160 - 173 lb.)

HP NetServer LH 6000r

Height	354.7 mm (14 in)
Width	482.6 mm (19 in)
Depth	749.2 mm (29.5 in)
Weight	72.6 – 78.5 kg (160 - 173 lb.)

Power Requirements

Power Supply Specifications: Three power supplies, plus one for redundancy

Power supply type	Wide range, PFC
Input voltages:	
Nominal:	100 to 240 VAC, 11.7A/5.6 A at 50/60 Hz
Range:	90 to 264 VAC at 47 - 63 Hz
Power availability:	780 W continuous

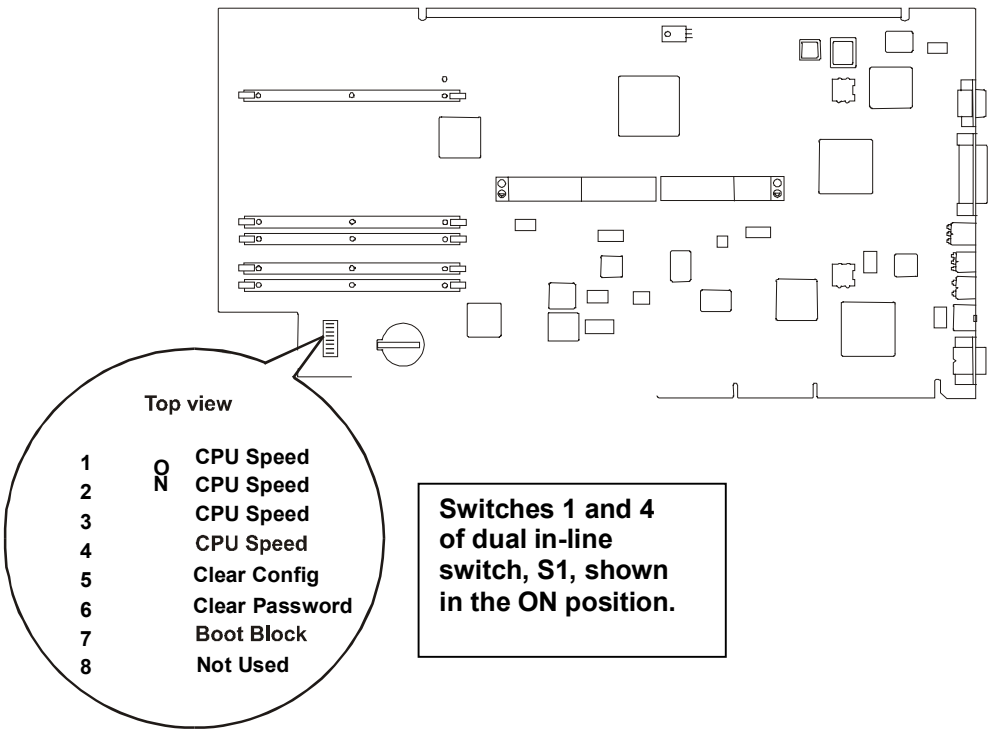
Minimum System Requirements

Voltage	Volt/Amps	Amps	Watts
100	1177	11.7	1166
120	1153	9.6	1141
200	1120	5.6	1099
230	1117	4.9	1095

Switch Settings

The configuration switch, S1, is located on the lower left of the system board of the system board assembly. To change the switch settings, it is recommended that the system board assembly be removed from the chassis.

NOTE Only the first four switches set the processor speed. Do not change the processor speed switch settings.



Configuration Switch Location

Configuration Switches S1-S4 – CPU Speed

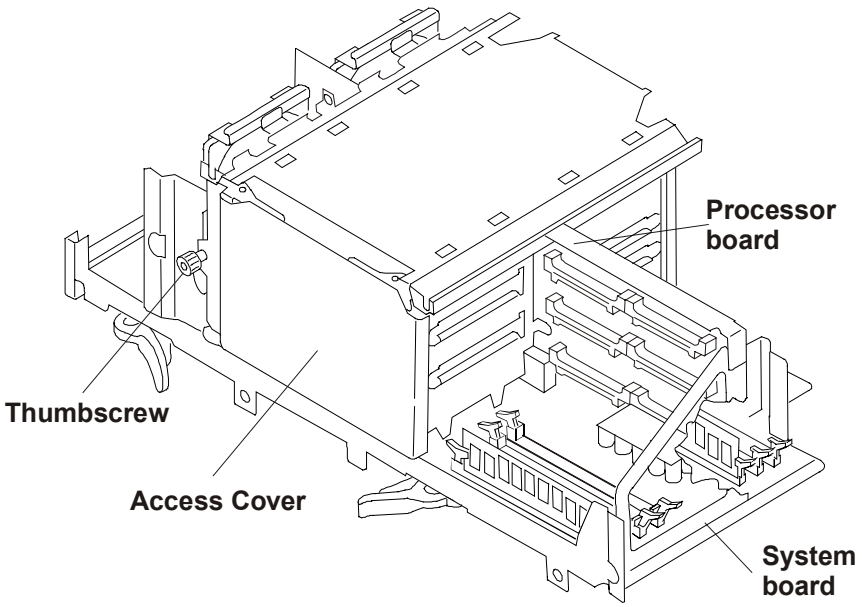
Speed	Switch 1	Switch 2	Switch 3	Switch 4
550 MHz	ON	OFF	OFF	OFF
600 MHz	OFF	ON	ON	ON
650 MHz	OFF	ON	ON	OFF
700 MHz	OFF	ON	OFF	ON
750 MHz	OFF	ON	OFF	OFF

NOTE Not all processor speeds are supported.

Configuration Switches S5-S8

Switch	Function	To Enable
S5	Clear Configuration	ON (normally OFF)
S6	Clear Password	ON (normally OFF)
S7	Boot Block	ON (normally OFF)
S8	Not Used	N/A

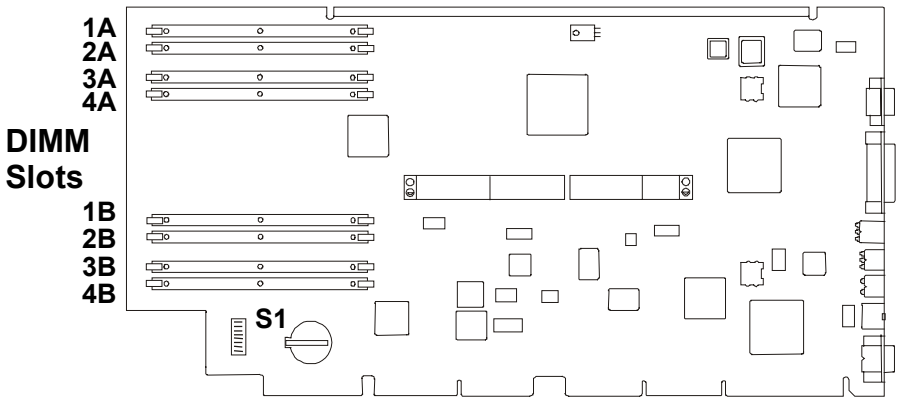
System Board Assembly Illustration



System Board Illustration

The figure shows the location of the major components on the system board. Refer to **Switch Settings** before changing any switches and **Processor Guidelines** before installing or replacing processors.

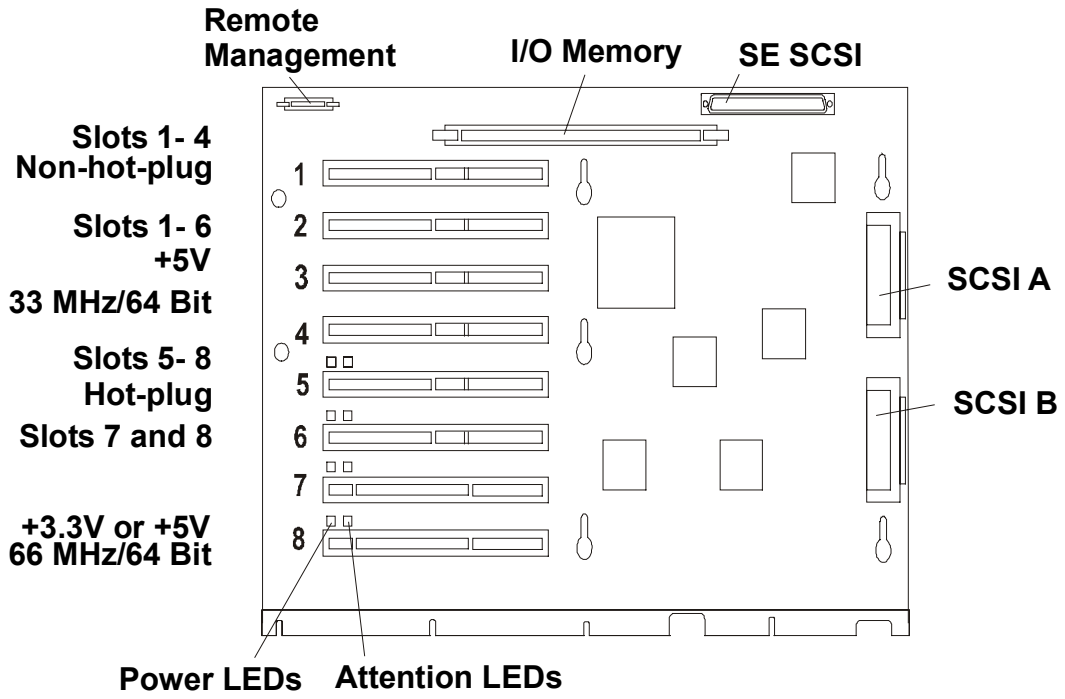
CAUTION	Some switches, if incorrectly set, may result in damage to system components. Damage due to incorrect switch settings is not covered by the HP warranty.



System Board

I/O Board Illustration

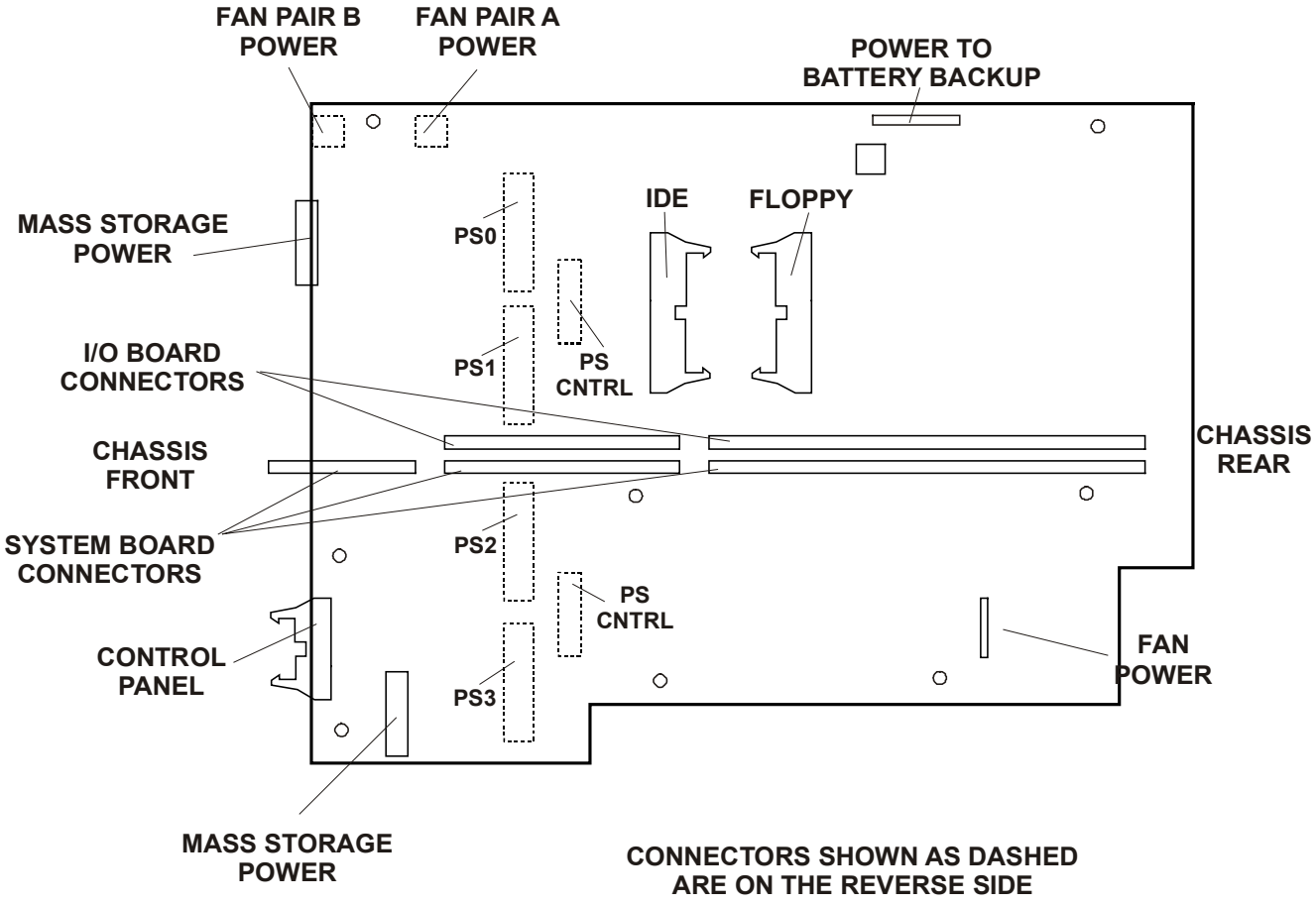
The figure shows locations of the major components on the I/O board.



I/O Board

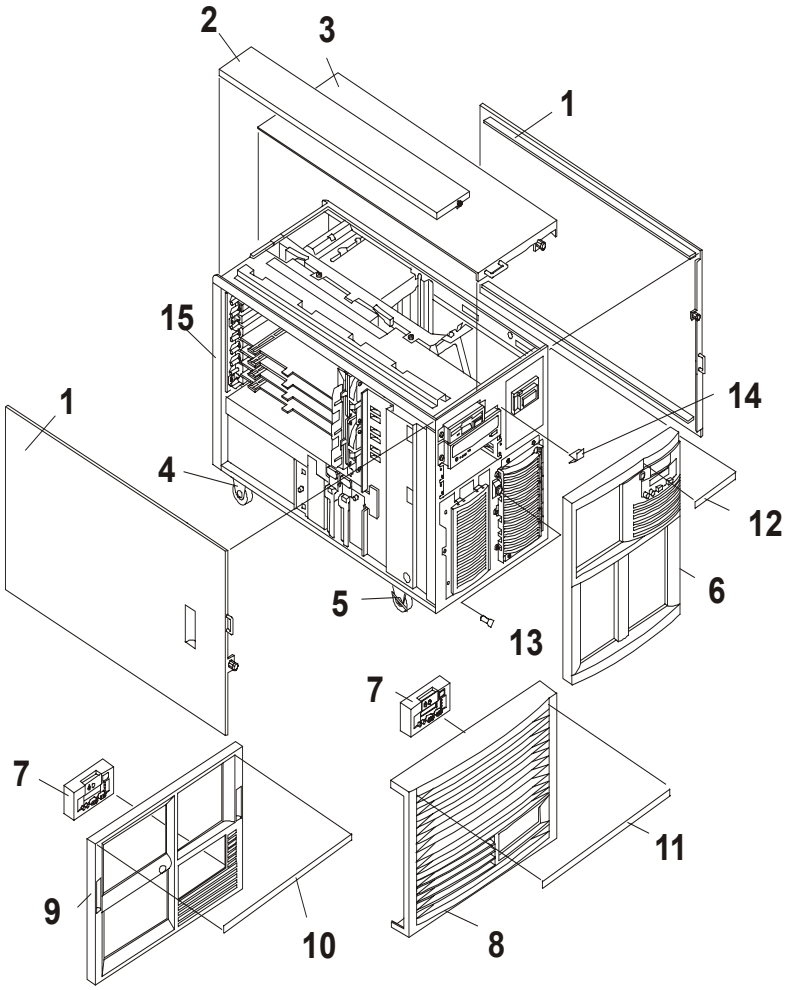
Power Management/Interconnect Board Illustration

The figure shows locations of the major connections on the Power Management/Interconnection board.

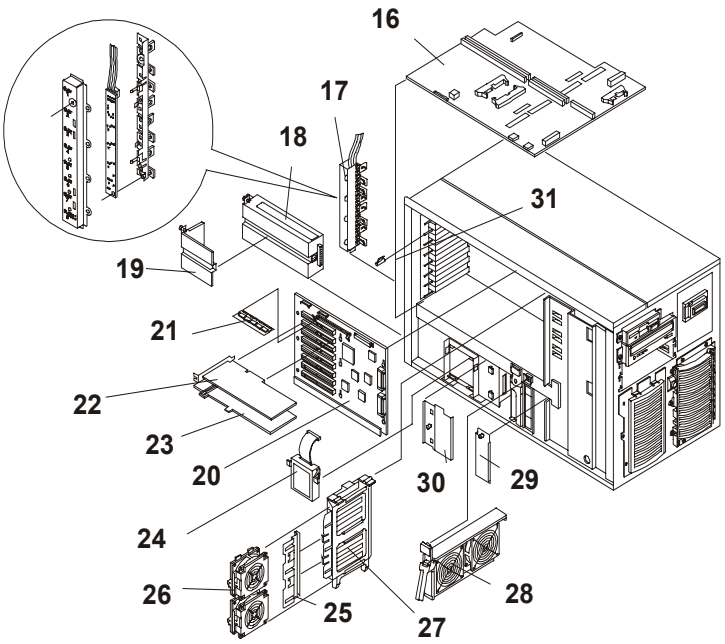


3 Parts Information

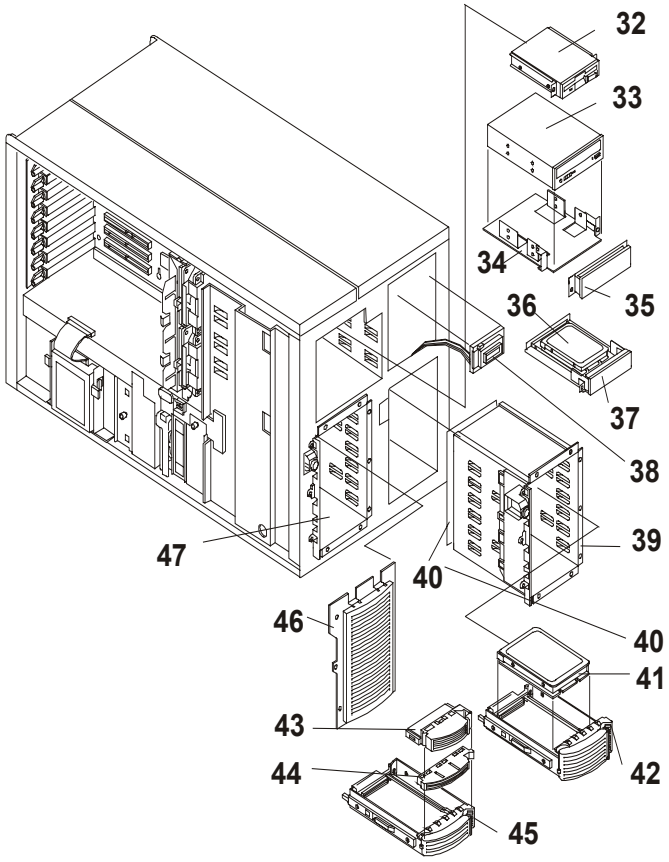
Exploded View - Covers, Bezel, Front Panel



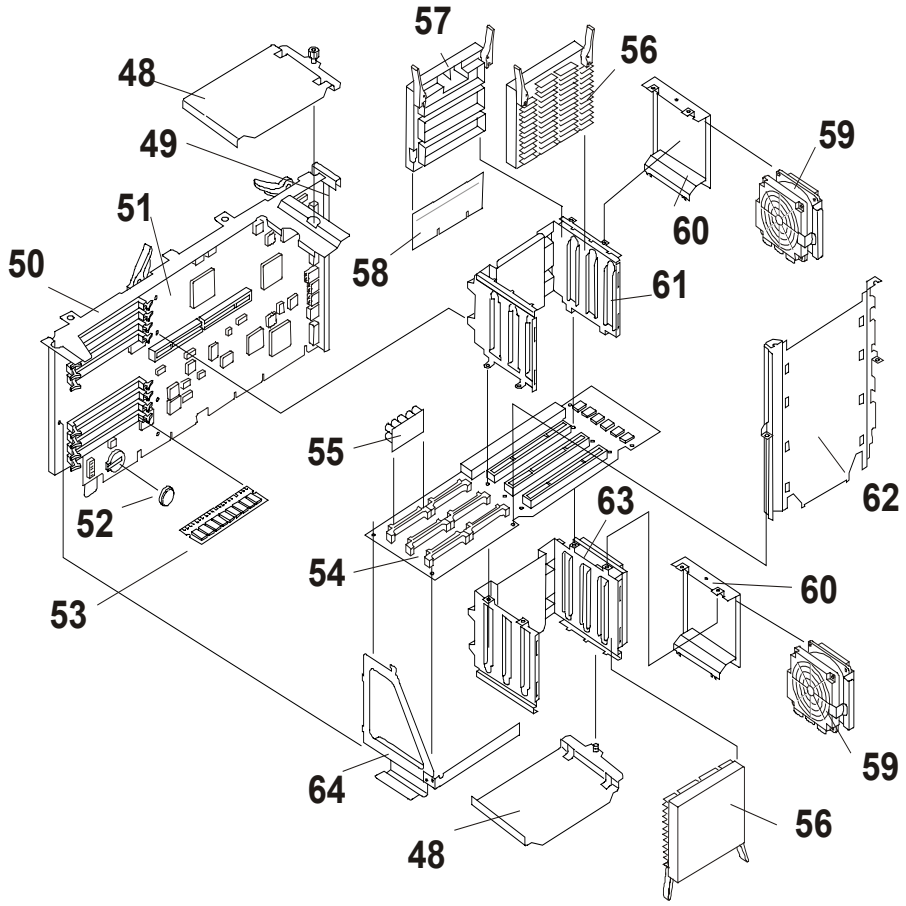
Exploded View - Power Supply, I/O Board, Fans



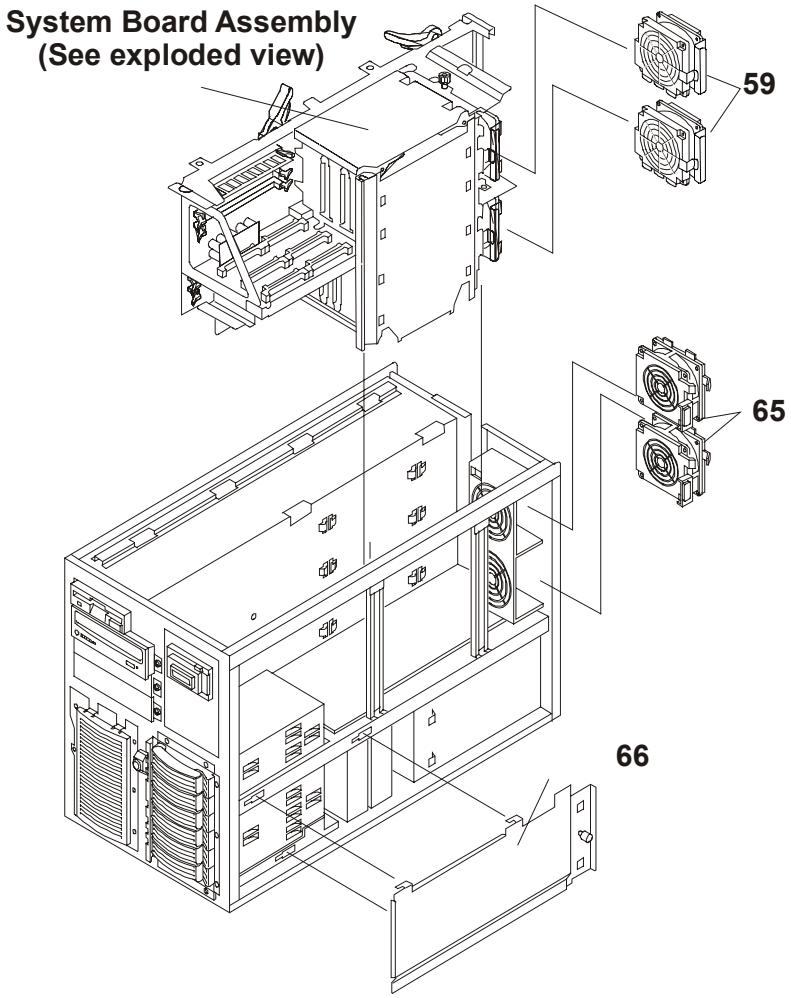
Exploded View - Mass Storage



Exploded View - System Board Assembly



Exploded View - Exhaust Fans



Replaceable Parts List

The items in this list and the corresponding item numbers in the respective Exploded Views apply to both models of the HP NetServer, except where noted.

NOTE These part numbers are the numbers available at the time of publication. Part numbers may be revised after the publication date. HP's parts price list database will generally contain a pointer to the revised part number.

When replacing the system board, remove the processor(s), terminator(s) (where used), and VRM(s) and transfer these to the new system board. Note the switch settings on the original board and transfer them to the replacement board.

Fig.	Description	Replacement	Exchange
1	Side panels (top and bottom in rack version)	5064-4694	
2	Top cover - I/O board side	5064-7906	
3	Top cover - system board side	5064-7910	
4	Rear castors	1490-1007	
5	Front castors	5182-9416	
6	Pedestal bezel – w/lock	D8228-63019	
7	Control panel -bezel (for rack versions only)	5064-4639	
8	HP rack bezel – w/lock	D8228-63018	
9	Non-HP rack bezel – w/lock	D8228-63029	
10	System Nameplate - Non-HP rack	D8228-63011	
11	System Nameplate - HP rack	D8228-63012	
12	System Nameplate - pedestal	D8228-63010	
13	System key	5182-4534	
14	Bezel latch	D8228-63023	
15	Chassis	Not orderable	
16	Power Management/Interconnect board	D8228-63006	D8228-69006
17	PCI Hot-Plug Assy. (includes: shell, PCA, card retainers, latches, and cables)	D8228-63024	
18	Power supply	0950-2816	
19	Power supply cover	5002-6989	
20	I/O Board	D8228-63001	D8228-69001
21a	I/O channel memory, 32 MB	D8228-63020	D8228-69020
21b	I/O channel memory, 64 MB	D8228-63021	D8228-69021
21c	I/O channel memory, 128 MB	D8228-63022	D8228-69022
22	Accessory PCI card - example	N/A	
23	PCI slot divider	Not orderable	
24	NetRAID battery backup module plus cable - Option	D8550-63001	

Fig.	Description	Replacement	Exchange
25	Front Card Hold Down	Not orderable	
26	I/O fan	D8228-63013	
27	PCI card guide/ I/O fan support	Not orderable	
28	Power supply fans w/frame	D8228-63015	
29	Forward I/O side air baffle	Not orderable	
30	Rear I/O side air baffle	Not orderable	
31a	PCI latch (part of item 17)	D8228-63027	
31b	PCI latch, Hot Plug (part of item 17)	D8228-63026	
32	1.44 MB floppy disk drive	5064-6554	
33	CD ROM drive	D4384-60002	
34	CD ROM/Tape drive mounting trays (2-pack, no front panel)**	D2199A**	
35	Drive bay cover	5063-8389	
36	3.5 inch, 9.1 GB Ultra-Wide SCSI drive (7200 rpm) for common tray only**	D4911A**	
37	3.5 inch hard drive mounting trays (3 pack non-hot swap)**	D2198B**	
38	Control panel w/cable	D8230-60000	
39	Hot-swap drive cage assy.	D8520-63003	D8520-69003
40	Duplex SCSI PCA (Optional)	D8280-63000	
41a	3.5 inch, 9.1 GB Ultra/Wide, hot-swap drive (7200 rpm) **	D4911A**	
41b	3.5 inch, 9.1 GB Ultra/Wide, hot-swap drive (10000 rpm)**	D7049A**	
41c	3.5 inch, 18.2 GB Ultra/Wide, hot-swap drive (10000 rpm)**	D6108A**	
41d	3.5 inch, 9.1 GB low-profile, hot-swap Ultra2 drive (7200 rpm) **	D6106A**	
41e	3.5 inch, 9.1 GB low-profile, hot-swap, Ultra2 drive (10000 rpm)**	D6107A**	
41f	3.5 inch, 18.2 GB low-profile, hot-swap, Ultra2 drive (7200 rpm)**	D7174A**	
41g	3.5 inch, 18.2 GB low-profile, hot-swap, Ultra2 drive (10000 rpm)**	D7175A**	
41h	3.5 inch, 36.4 GB half-height, hot-swap, Ultra2 drive (10000 rpm)**	D8210A**	
42	Half-height, hot-swap disk tray**	D6127A**	
43	Hot-swap filler panel	5064-4689	
44	Hot swap-spacer	Not orderable	
45	Low-profile, hot-swap disk tray**	D6128A**	
46	Hot-swap bay cover	Not orderable	
47	Second Hot Swap Drive Cage (Optional)	D9158A	

Fig.	Description	Replacement	Exchange
48	Processor card cage cover	Not orderable	
49	System Board Bulkhead	Not orderable	
50	System Board Carrier	Not orderable	
51	System board	D9103-63007	D9103-69007
52	System battery	D8520-63012	
53a	DIMM 128MB SDRAM	D8265-63001	D8265-69001
53b	DIMM 256MB SDRAM	D8266-63001	D8266-69001
53c	DIMM 512MB SDRAM	D8267-63001	D8267-69001
53d	DIMM 1GBMB SDRAM	D8268-63001	D8268-69001
54	Processor board	D9143-63003	D9143-69003
55	Voltage Regulator Module	D8520-63010	
56a	PIII/550 512KB Processor	D9333-63001	D9333-69001
56b	PIII/550 1MB Processor	D9334-63001	D9334-69001
56c	PIII/550 2MB Processor	D9335-63001	D9335-69001
57	Processor Terminator/Baffle Assembly	D8228-63009	
58	Processor Terminator, Part of Item 52	Not orderable	
59	Processor fan	D8228-63016	
60	Fan Guide	Not orderable	
61	Processor Cage - Upper	Not orderable	
62	Processor Cage - Support	Not orderable	
63	Processor Cage - Lower	Not orderable	
64	Stiffener/Strut	Not orderable	
65	System (Exhaust) fans	D8228-63014	
66	System side air baffle	5002-6995	
*	Control panel cable (ribbon)	D8228-63030	
*	Hot swap bay power harness	D8228-63031	
*	Auxiliary hot swap bay (left)/ non-hot swap power harness	5183-3449	
*	Management port cable (ribbon)	5183-2143	
*	IDE signal cable (ribbon)	5183-3442	
*	Floppy disk drive cable (ribbon)	5183-3443	
*	Internal SCSI (ribbon)	5183-3444	
*	Mouse	C3751-60201	

* This part is not on an exploded view. **May be ordered as an accessory.

Keyboards

Language	Part Number	Language	Part Number
US	D4950-63001	Danish	D4950-63016
Arab/French	D4950-63025	Fr. Canadian	D4950-63002
Portuguese	D4950-63027	German	D4950-63003
Cyrillic	D4950-63030	Spanish	D4950-63004
Belgian/Flemish	D4950-63014	French	D4950-63005
Italian	D4950-63017	Norwegian	D4950-63009
Arab/English	D4950-63020	Swiss	D4950-63011
Korea/Hangu	D4950-63021	Swedish	D4950-63012
Taiwan	D4950-63023	UK	D4950-63013
Poland	D4950-63035	Czech	D4950-63036
Hungarian	D4950-63037	Greek	D4950-63032
Turkish	D4950-63035	Dutch	D4950-63006

Power Cords

Country	Part Number	Country	Part Number
Australia/New Zealand	8120-1369	India/South Africa	8120-4211
Canada/United States	8120-1751	Japan	8120-4753
Denmark	8120-2956	Switzerland	8120-2104
Europe	8120-1689	United Kingdom	8120-1351

Cabling Diagram

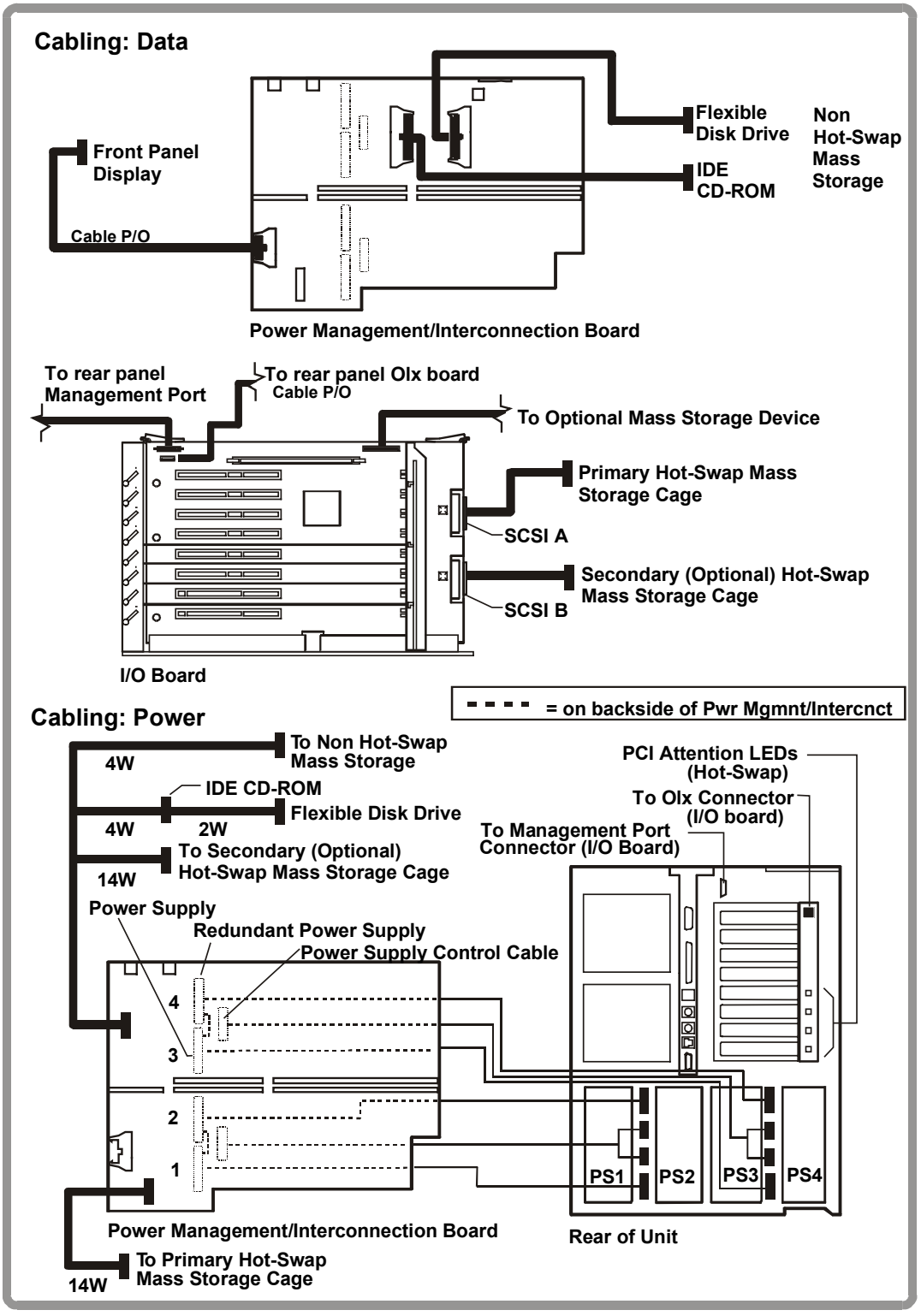
Key

PS2	Primary Power Supply Cage Cable
PS3	Secondary Power Supply Cage Cable

Cables and Part Numbers

Cable		Part Nos.
C62	Internal SCSI (Wide) LVD Cable (SCSI A to Primary Mass Storage)	5183-3444
C65	Internal SCSI (Wide) LVD Cable (SCSI B to Secondary Mass Storage)	5183-6567
C72	Internal SE SCSI Cable	5183-3445
C73	External SCSI (Wide) LVD Cable (SCSI A or B to Rear Chassis)	5183-3446
D7	IDE CD-ROM Cable	5183-3442
F7	Flexible Disk Cable	5183-3443
P2	Primary Mass Storage Power Cable	5183-3448
P3	Secondary Mass Storage, Non-Hot-Swap Device, CD-ROM, and Flexible Disk Power Cable	5183-3449
R1	Remote Management Cable	5183-2413
	* Optional cable	

HP NetServer LH6000/LH6000r



4 Diagnostics

Diagnostic Tests

When the server boots, a series of tests are displayed on the screen. The number of tests displayed depends on the configuration of the server. The following are the kinds of errors a user might get with the HP NetServer.

- Built-in diagnostic Error Messages.
- BIOS and other error messages. These are errors detected by the system BIOS outside the built-in diagnostics or application errors.
- Beep Codes when errors cannot be viewed on the screen.

To see the Power On Self-Tests (POST):

- The HP NetServer must be functionally able to run the diagnostics.
- The video subsystem must be functional.
- The keyboard must be functional.

NOTE	BIOS ROM version number is displayed on the monitor screen during power-up.

Diagnostics Description

The diagnostics (Power-On Self-Test "POST") run automatically each time the server is powered on. These diagnostics, which reside in the BIOS ROM, isolate server-related logic failures and indicate the board or component that needs to be replaced, as indicated by the Error Messages. Most server hardware failures will be accurately isolated by the diagnostic

Go to "View System Error", displayed on the bottom of the boot screen, for an explanation of each test.

You see a list of the errors that occurred and suggestions on how to resolve them. Use the Setup utility (press **F2** during the boot process) to make any changes to the configuration.

WARNING	You should always turn off the power and disconnect the power cords to the server before attempting to remove the cover and touch the internal components. Failing to do so can expose you to electric shock and the server's components to damage. The power switch does NOT turn off standby power, so disconnect the power cords to turn off standby power.

CAUTION	Do not operate the HP NetServer with any of its covers off for more than 60 minutes. Otherwise, overheating can damage processors, boards, and mass storage devices.

HP NetServer DiagTools

The purpose of hardware diagnostic software is to provide tools for checking hardware problems. By design, diagnostic software executes simple tests of each hardware component in turn. Usually, such tests create assurance that hardware is not the source of system problems. This allows the user to eliminate hardware as the cause of the problem and to focus on operating system configuration parameters, network connections, and application software configuration parameters as the source of the problem.

If hardware problems are confirmed, the diagnostic software program can sometimes detect and diagnose the subsystem or specific system component that is the cause of the problem. In addition, diagnostic tools can capture information that allows support personnel to quickly assess the condition of system.

In order to be effective, diagnostic software tools must be used in the context of a wider troubleshooting procedure.

DiagTools Capabilities

DiagTools for HP NetServers is a set of off-line diagnostic tests, including tests for system and processor components, memory and storage elements, ports, and input/output devices. DiagTools is supplied on the *HP NetServer Navigator CD-ROM* .

The user prepares DiagTools software for use by transferring it to diskette. Then the DiagTools diskette is used to boot the server. A basic suite of tools checks key HP NetServer components, and a menu of advanced tests is available for in-depth testing.

DiagTools has the ability to test the following components:

- system board
- memory modules
- flexible disk drives
- serial ports
- video monitor
- processors
- hard disk drives
- keyboards
- parallel ports
- CD-ROM drives

DiagTools is an off-line diagnostic tests. Off-line diagnostics do not use the main operating system (OS) of the HP NetServer. The alternate DiagTools OS has far fewer features than the full-fledged OS. Thus, its capabilities are limited to a set of basic tests and a series of advanced tests. In addition, DiagTools does not use any tests that might write over and thus destroy user data. Tests that require user inputs or decisions are left to the advanced series of tests.

You can use DiagTools to perform the tasks listed below:

- display a high-level inventory of the system under test
- save and print a detailed inventory of hardware components
- conduct a basic test of components listed in the system inventory
- display “PASSED” or “FAILED” overall results of basic tests
- record detailed test results of basic system tests
- display a menu of advanced tests
- select and run one or a series of advanced tests
- add the record of results of advanced tests to the record of basic tests
- view a list to locate the meaning of a specific error code
- view one or more steps to help confirm and isolate error conditions
- browse the Support Ticket, which contains the detailed inventories and test results

- add comments to the Support Ticket

If you have TopTools remote management software installed and configured for use with DiagTools, you can accomplish any of the above list of tasks remotely.

About Error Messages

A hexadecimal number designates each error message reported by DiagTools; a short note on the type of error; and a list of one or more steps the user can take in response. When you run a test, it exercises many aspects of the hardware, so the number of possible error messages exceeds 300. Most of these are encountered rarely, if ever.

Error codes can be viewed on line from the DiagTools User menu within the advanced series of tests, or you can refer to Chapter 3 of the *HP NetServer DiagTools Error Reference and User Guide*.

Advantages and Limitations of Hardware Diagnostics

Off-line diagnostic software is useful in making sure that hardware has been eliminated as the cause for possible system problems. Such diagnostic tools can easily be shipped with a server, and they are relatively easy to use.

However, off-line diagnostic software should be used only by experienced personnel who can take a wider view of its limitations, which include:

- Booting the server from the diagnostics diskette
- No access to operating system error logs, since the OS is not operating at the same time as the diagnostic tools
- Limited ability to test only a single component at a time
- Inability to indicate problems with wrongly configured systems or the network

Event Log Menu

The Event Log menu has information about current and resolved events. The menu provides a list of all events currently in the log. These may be errors, or normal system events like a system boot.

NOTE	You can view system events in the status screen and in the Event Log Report Utility in NetServer Utilities on Navigator. The details may differ slightly.

1. Select Event Log from the Main Menu.

   The first two lines of the log appear on the HP NetServer's front panel display:

   ```
   ****Event Log****
   >008^ POWER Unit
   ```

2. Use the arrow buttons to see the complete list.

   This is a sample event log:

   ```
   ****EventLog****
   >008^ POWER Unit
   >007^ TempError
   >006  CPU Failure
   >005  POWER Unit
   >004  Volt Error
   >003  CPU Failure
   ```

```
>002^ POWER Unit
>001  System Boot
```

Each line includes a brief summary of a log entry, including the log entry number. An "^" on a log entry means the problem is current.

3. To read the complete log for an event, use the arrow keys to select the entry and press *Enter*.

   An example of a complete log, providing details about two events, 001 and 008, appears below.

```
>001 System Boot
Entry #001
07 /22 /99
10 :27 :15
System Boot
Event
>008^ POWER Unit
Entry #008
Critical Pending
07 /22 /99
10 :27 :15
Proc. 2 FRB3
Failure
```

4. Use the arrow keys to scroll through the entire log.
5. To return to the Event Log menu, press *Escape*.
6. Press *Escape* again to return to the Main Menu.

POST Routines

The following Power On Self-Tests (POSTs) are performed during system startup:

Test	Description
Processor Test	Tests the processor's registers. Test failure causes an error message to be displayed and the boot process to abort.
System (BIOS) ROM Test	BIOS ROM chip calculates an eight-bit checksum. Test failure causes an error code to be displayed and the boot process to abort.
Memory Subsystem Test	Tests the physical configuration of the memory subsystem. The test checks for valid memory module combinations. Test failure causes an error code to be displayed.
RAM Refresh Timer Test	Tests the RAM refresh timer circuitry. Test failure causes an error message to be displayed and the boot process to abort.
Interrupt RAM Test	This test checks the first 64 K of system RAM used to store data corresponding to various system interrupt vector addresses. Test failures cause an error message to be displayed and the boot process to abort.
CMOS RAM Test	Checks the CMOS RAM for start-up power loss, verifies these CMOS RAM checksum(s): ISA, HP, and CMOS RAM checksum. Test failure causes error codes to be displayed.

Test	Description
Cache Memory Test	Tests the processor's on-chip (internal) cache RAM. Test failure causes an error message to be displayed and the boot process to abort.
Keyboard/Mouse Controller Test	Checks for proper operation of the Keyboard/Mouse Controller. Test failure causes an error code to be displayed.
Timer 0/Timer 2 Test	Tests Timer 0 and Timer 2. Test failure causes an error code to be displayed.
DMA Sub-system Test	Checks the DMA controller registers. Test failure causes an error code to be displayed.
Interrupt Controller Test	Tests the interrupt masks, the master controller interrupt path (by forcing an IRQ0), and the industry-standard slave controller (by forcing an IRQ8). Test failure at any point causes an error code to be displayed.
RAM Address Line Independence Test	Verifies the address independence of real-mode RAM (that address lines are not stuck together). Test failure causes an error code to be displayed.
Real-Mode Memory Test (First 640 K)	Read/write test on system real-mode RAM. The test checks each block of system RAM to determine how much is present and displays the current base value upon successful completion of the test. Test failure of a 64 K block of memory causes an error code to be displayed and the remainder of the memory test to be skipped.
Shadow RAM Test	Tests Shadow RAM in 64-Kbyte segments, except for the segments beginning at A000h, B000h, and F000h. If they are not being used, segments C000h, D000h, and E000h are tested. Test failure causes an error code to be displayed.
Real-Time Clock Test	Checks the real-time clock registers and performs a test that ensures the clock is running. Test failure causes an error code to be displayed.
Keyboard Test	Invokes built-in keyboard self-test of keyboard's microprocessor and tests for stuck keyboard keys. Test failure causes an error code to be displayed.
Mouse Test	Invokes built-in mouse self-test of mouse's microprocessor and tests for stuck mouse buttons. Test failure causes an error code to be displayed.
Flexible Disk Controller Subsystem Test	Tests for proper operation of the flexible disk controller. Test aborts after the first error is found and will not test any further. Test failure causes an error code to be displayed.
Internal Numeric Coprocessor Test	Checks for proper operation of the numeric coprocessor part of the processor. Test failure causes an error message to be displayed and the boot process to abort.
Serial Port Test	Tests the embedded serial port registers. Test failure causes an error code to be displayed.
Parallel Port Test	Tests the one embedded parallel port, if it is enabled. Test failure causes an error code and an error message to be displayed.
Hard Disk Subsystem Test	Tests for proper operation of the hard disk controller and performs a read-verify of a sector on the disk. Test aborts after the first error is found and will not test any further. Test failure causes an error code to be displayed.
System Configuration Tests	Checks for configuration errors and checksums accessory ROMs. Test failure causes an error code to be displayed.

Beep Codes

If the POST routines cannot display messages when an error occurs before the video display is initialized, the server emits a series of beeps. This means that if on boot you get a blank screen, but hear beeps, you should refer to the table below to interpret the beeps.

Beep Codes for Fatal Errors

P = Check and replace processor board
S = Check and replace system board
M = Check and replace memory modules
R = Replace ROM chip

Beep Code	Test Failure	I/O port 80H	Repair
1-2-2-3	BIOS ROM checksum	16	R
1-3-1-1	Test DRAM refresh	20	S, P
1-3-1-3	Test 8742 Keyboard Controller	22	S, P
1-3-3-1	Test DRAM	28	M
1-3-4-1	Test 64K base address lines	2C	M, P
1-3-4-3	Test 64K base memory	2E	M, P
1-4-1-1	Test 64K base memory (upper 16 bits)	30	M, P
2-1-2-3	Copyright checksum	46	R

If you still don't see anything and:

1. If you press **F1** and nothing happens, confirm the following:
   - ◊ The keyboard cable is properly connected to the keyboard and the keyboard port.
   - ◊ The keyboard is not locked, and network server mode is not enabled. (If either the keyboard lock or network server mode was enabled in the Setup utility, type in the password.)
2. If the server beeps several times and does not display an error message, the server has experienced a fatal POST error. If this happens, refer to the for instructions and precautions, turn off the system, unplug the power cords, and do the following:
   - ◊ Remove and reinsert the all NetServer PCAs and accessory boards firmly in their slots.
   - ◊ Remove and reinsert the CPU(s) and VRM(s) firmly in their sockets in the system board.
   - ◊ Remove and reinsert the memory modules firmly and correctly in their sockets.

Error Messages

0000 The power-on self-test has detected a failure limited to the system board internal functions.

Skipping the error message and continuing may result in unstable behavior, or a system hang during the boot process.

In case of further errors, your system board may need to be replaced. Contact your service representative.

0011 When the HP NetServer remains unplugged for a long period of time, the battery that provides the current to keep the system date and time may become discharged.

1. Check that the battery is properly inserted.
2. If necessary, replace the battery as described in your *HP NetServer Installation Guide*.
3. Set time and date from the Setup utility or from your operating system.

0012 The HP NetServer configuration has been cleared or has not been initialized. Run the Setup utility to re-configure your system.

0020 An ISA accessory board reports an initialization problem.

The ROM on the accessory board is either bad, or the board is conflicting with a system board reserved resource (address, DMA or IRQ).

1. Change the resources used by the ISA accessory boards.
2. Try to disable (free) resources used by system board devices.
3. If the problem persists, the accessory board may be defective. Contact the accessory board vendor.

0040 The HP NetServer Serial Number has been lost or has not been initialized.

Pressing **[F2]** will automatically run the HP Serial Utility and allow you to enter the Serial Number.

0041 Internal data, the product type, has been lost or has not been initialized.

Pressing **[F2]** will automatically run the HP Product Utility and allow you to re-enter this data. Be careful, you have to choose the right value according to the system you have.

0060 The network remote power-on feature has not been properly initialized.

It will not be possible to remotely power-on or wake up your HP NetServer with the network interface.

1. Check that the internal flat cable is firmly connected on the system board and on the integrated LAN interface.
2. Power off the HP NetServer and disconnect the power cords for a few seconds.

0070 The Smart Interrupt Router FPGA failed to initialize. This problem prevents your system from booting and operating. If the error persists, replace the system board.

0071 The data for the Smart Interrupt Router FPGA is corrupted. This problem prevents your system from booting and operating. If the error persists, replace the BIOS ROM Chip.

0075 The firmware for the Integrated HP NetRAID is not responding. This problem prevents the operation of the Integrated HP NetRAID.

To correct this problem, flash the Integrated HP NetRAID firmware and reboot the system.

If the error persists, replace the I/O board.

0080 The HP NetServer Management Controller failed its self-test.

Due to this failure remote access and server management event logging are not available.

- To correct this problem reset the Management Controller by powering off the HP NetServer and disconnecting the power cords for 20 seconds. Reconnect the power cords and power on the HP NetServer.

  OR,

- Update the system BIOS by running the flash utility from the *HP NetServer Navigator CD-ROM*. To do this, insert the *HP NetServer Navigator CD-ROM* in the CD-ROM drive and power-cycle your system. See **BIOS Recovery.**

If the error persists, your Power Management/Interconnection board may need to be replaced. Contact your service representative.

0090 The DIMM Management Controller has failed to respond.

This does NOT affect the performance or functionality of the memory. However, due to this failure DIMM management features are not available.

To correct this problem reset the Management Controller by powering off the HP NetServer and disconnecting the power cords for 20 seconds. Reconnect the power cords and power on the HP NetServer.

If the error persists, your system board may need to be replaced. Contact your service representative.

0100 A key on the keyboard has been pressed during the HP NetServer power-on self-test.

1. Ensure that nothing was put on the keyboard during boot process, and that a key was not accidentally pressed down.
2. If the error persists, your keyboard may need to be replaced. Contact your service representative.

0101 The keyboard has reported an error during its self-test.

1. Restart your HP NetServer.
2. If the error persists, your keyboard may need to be replaced. Contact your service representative.

0102 The system board self-test has detected a general failure on the integrated keyboard controller.

Your system board may need to be replaced. Contact your service representative.

0103 The keyboard is not connected.

1. Check that the keyboard connector is firmly connected.
2. If the problem persists, your keyboard cable may be damaged or your keyboard may need to be replaced. Contact your service representative.

0105 The mouse has reported an error during its self-test.

1. Clean the mouse and its moving ball as described in the User's Guide.
2. If the problem persists, your mouse may need to be replaced. Contact your service representative.

0106 The mouse is not responding.

1. If the mouse has just been removed, press **[F4]** to automatically validate the change.
2. Otherwise, check that the mouse connector is firmly connected.
3. If the problem persists, your mouse may need to be replaced. Contact your service representative.

0300 The flexible disk drive A has reported an error during its self-test.

1. Check if a diskette can be properly inserted and removed from the flexible disk drive.
2. Check that the flexible drive type configured in the Setup utility matches the flexible disk drive installed in the HP NetServer.
3. Check that all cables and power cords are firmly connected.

4. If the problem persists, your flexible disk drive may need to be replaced. Contact your service representative.

0306 The system board self-test has detected a general failure on the integrated flexible disk controller.

Your system board may need to be replaced. Contact your service representative.

0310 The flexible disk drive A is not responding but is configured in the Setup utility.

1. If the flexible disk drive A has just been removed, press **[F4]** to automatically validate the change.
2. Otherwise, check that all cables and power cords are firmly connected.
3. If the problem persists, your flexible disk drive may need to be replaced. Contact your service representative.

0400 The CD-ROM drive has reported an error during its self-test.

1. If a CD-ROM disk is present, check that it is correctly inserted.
2. Check that CD-ROM drive door or tray has not been opened or closed during the self-test.
3. Check that all cables and power cords are firmly connected.
4. If the problem persists, your CD-ROM drive may need to be replaced. Contact your service representative.

0401 The CD-ROM drive is not responding but is configured in the Setup utility.

1. If the CD-ROM drive has just been removed, press **[F4]** to automatically validate the change.
2. Check that all cables and power cords are firmly connected.
3. If the cable is damaged, connect the hard disk drive to another IDE cable, if available.
4. If the problem persists, your CD-ROM drive may need to be replaced. Contact your service representative.

0500 The system board self-test has detected a general failure on the integrated hard disk controller.

Your system board may need to be replaced. Contact your service representative.

051X The specified hard disk drive has reported an error during its self-test.

1. Check the hard disk drive configuration with the Setup utility. If necessary, edit the user hard disk parameters to set lower values.
2. If the problem persists, your drive may need to be replaced. Contact your service representative and specify the error code.

Error codes #0510, #0511, #0512, #0513 respectively apply to IDE0, IDE1, IDE2, and IDE3 as described in the Setup utility.

052X The specified hard disk drive is not responding but is configured in the Setup utility.

1. If the specified hard disk has just been removed, press **[F4]** to automatically validate the change.
2. Check that all cables and power cords are firmly connected.

3. If the cable is damaged, connect the hard disk drive to another IDE cable, if available.
4. If the problem persists, your hard disk drive may need to be replaced. Contact your service representative.

Error codes #0520, #0521, #0522, #0523 respectively apply to HDD0, HDD1, HDD2, and HDD3 as described in the Setup utility.

053X A hard disk drive has been found on the second (slave) position on the IDE cable, but no hard disk has been found on the first (master) position.

This message applies to the primary channel cable marked IDE1 (#0530) or to the secondary channel cable marked IDE2 (#0531).

1. If only one hard disk is connected on the cable, use the other connector to connect the hard disk in the first (master) position.
2. If two disks are connected on the cable, check that all cables and power cords are firmly connected for both hard disk drives.
3. If the error message appears just after a hard disk drive installation, check the hard disk drive installation manual for master/slave specific jumper configuration.

0600 The video memory size detected during the power-on self-test is smaller than previously detected. The video memory module is either disconnected, defective or has been replaced by a smaller one.

1. If the video memory module has just been removed or replaced by a smaller one, press **[F4]** to automatically validate the change.
2. If the video memory modules have not been removed or changed, ensure they are properly inserted in their sockets.
3. If the problem persists, your video memory module may need to be replaced. Contact your service representative.

0700 The system memory size detected during the power-on self-test is smaller than previously detected. One or several main memory modules are either disconnected, or have been replaced by smaller ones.

1. If some main memory modules have just been removed or replaced by smaller ones, press **[F4]** to automatically validate the change.
2. If no main memory module has been removed or changed, ensure all modules are properly inserted in their sockets.
3. If the problem persists, one of your main memory modules may need to be replaced. Contact your service representative.

07XX One main memory module has reported an error during its self-test.

(This error may cause serious problems to the HP NetServer operation.)

1. Isolate the defective memory module using the error code 07xy with x = bank number, y = module number. The memory module sockets are put in the following order: 071X=A, 072X=B, and 073X=C.
2. Remove the memory module from its socket and clean the edge connector. Refer to your *HP NetServer LH 6000/LH 6000r Installation Guide* for handling precautions.
3. Re-install the memory module.

4. If the problem persists put your memory module in another socket. If the error code changes and indicates the new location of the memory module, it needs to be replaced. Contact your service representative.
5. To allow the HP NetServer to start with the remaining available memory, remove the defective module and change the memory size in the Setup utility.

0800 The cache memory size detected during the power-on self-test is smaller than previously detected. The cache memory module is either disconnected, defective or has been replaced by a smaller one.

1. If the cache memory module has just been removed or replaced by a smaller one, press **[F4]** to automatically validate the change.
2. If the cache memory module has not been removed or changed, ensure it is properly inserted in its socket.
3. If the problem persists, the cache memory module may need to be replaced. Contact your service representative.

0801 The cache memory module has reported an error during its self-test.

1. Remove the cache memory module from its socket and clean the edge connector. Refer to your *HP NetServer Installation Guide* for handling precautions.
2. Re-install the cache memory module.
3. If the problem persists, your cache memory module may need to be replaced. Contact your service representative and specify the error code.

0900 The integrated LAN interface has reported an error during its self-test.

1. Check that the LAN interface is properly inserted in its slot.
2. Check that the COAX module is correctly installed (if present).
3. Check that all the cables are firmly connected.
4. If the problem persists, your LAN adapter may need to be replaced. Contact your service representative.

0901 The integrated LAN interface is not responding.

1. If the integrated LAN interface has just been removed, press **[F4]** to automatically validate the change.
2. Check that the LAN interface is properly inserted in its slot.
3. Check that all cables and power cords are firmly connected.
4. If the problem persists, your LAN adapter may need to be replaced. Contact your service representative.

0B0X Your system is missing the Microcode Update data block for the Pentium III microprocessor.

You must correct this problem in order to avoid possible malfunction or reliability problems.

To correct the problem, update your BIOS by running the flash utility from your *HP NetServer Navigator CD-ROM*. To do this, insert the *HP NetServer Navigator CD-ROM* in the CD-ROM drive and power-cycle your system. See BIOS Recovery.

If updating your BIOS does not clear this error, contact your service representative.

0B1X Your system has failed to load the Microcode Update data block for the Pentium III microprocessor.

You must correct this problem in order to avoid possible malfunction or reliability problems.

To correct the problem, update your BIOS by running the flash utility from your *HP NetServer Navigator CD-ROM*. To do this, insert the *HP NetServer Navigator CD-ROM* in the CD-ROM drive and power-cycle your system. See BIOS Recovery.

If updating your BIOS does not clear this error, contact your service representative.

0B2X The Microcode Update data block for the Pentium III microprocessor is defective.

You must correct this problem in order to avoid possible malfunction or reliability problems.

To correct the problem, update your BIOS by running the flash utility from your *HP NetServer Navigator CD-ROM*. To do this, insert the *HP NetServer Navigator CD-ROM* in the CD-ROM drive and power-cycle your system. See BIOS Recovery.

If updating your BIOS does not clear this error, contact your service representative.

.

5 Troubleshooting

Preventive Maintenance Procedures

Refer to this table for preventive maintenance procedures for this HP NetServer. Be sure to turn off power to the NetServer when cleaning it.

Component	Time Frame	Maintenance Procedure
Keyboard	Regularly	Dust with damp, lint-free cloth.
Monitor screen	Regularly	Use "HP Video Screen Cleaning Solution" found in 92193M Master Clean Kit.
Mouse	Regularly	Refer to the mouse's manual for mouse maintenance procedures.
Tape drive heads	Monthly	Use "Magnetic Head Cleaning Solution" found in the 92193M Master Clean Kit.
Cooling fans and grilles	6 Months	Check functions of cooling fans and clean the intake openings on the chassis of dust, lint, and other obstructions to airflow.

CAUTION	DO NOT use petroleum-based cleaners (such as lighter fluid) or cleaners containing benzene, trichlorethylene, ammonia, dilute ammonia, or acetone. These chemicals could damage the keyboard's plastic surfaces.

HP recommends the periodic cleaning of tape heads, capstans, and guides on HP drive units and those products using high-density data cartridges and mini-data cartridges. This maintenance procedure prolongs tape and head life and helps reduce read/write errors due to dust and oxide

Troubleshooting Tips

WARNING	Before removing a cover, always disconnect the power cords and unplug telephone cables. Disconnect telephone cables to avoid exposure to shock hazard from telephone ringing voltages. Disconnect the power cords to avoid exposure to high energy levels that may cause burns when parts are short-circuited by metal objects such as tools or jewelry.

CAUTION	Do NOT operate the HP NetServer for more than 60 minutes with any cover (including power supplies and disk drives) removed. Otherwise, damage to system components may result due to improper cooling airflow. However, you can safely remove a cover while the HP NetServer is running to remove and replace PCI Hot Plug boards. For any other service activity requiring access to the processor board or I/O board, power down the HP NetServer and observe all safety precautions.

- For problems with the disk array controller board, refer to the appropriate HP NetRAID manuals.

- For problems with HP TopTools, refer to the *HP TopTools Administrator Guide* on the HP Web Site at:

http://www.hp.com/toptools

- For general information on management products, refer to:

http://www.hp.com/go/netserver_mgmt

and search for "management."

General Troubleshooting Sequence

To troubleshoot an installation problem, perform the following checks in the order given:

- Unplug the power cords, wait 20 seconds, plug the power cords in again, and restart the HP NetServer. Check for normal operation.
- Check all cable and power connections, including those in the rack, etc.
- Ensure the HP NetServer is properly configured.

  Most NetServer problems are the result of incorrect system and SCSI subsystem configurations.
  - ◊ Check the Setup Utility, and the SCSI Configuration Utility.
  - ◊ If the HP NetServer is configured with a disk array, check the Disk Array Utility.
- If the error is a network-related problem, determine if the server has enough memory and hard disk drive capacity. Consult your network operating system manual.
- Verify all cables and boards are securely plugged into their appropriate connectors or slots.
- If you suspect a hardware error, follow these steps:

  a. Log users off the LAN and power down the server.

  b. Extend the HP NetServer out of the rack and remove the cover.

  c. Simplify the HP NetServer configuration to the minimum required:
     - * Monitor
     - * Keyboard
     - * Mouse
     - * 1 hard disk drive and 1 flexible disk drive
     - * 1 CD-ROM

  d. Remove all third-party options, and reinstall each one, one at a time, checking the HP NetServer after each installation.

  e. Replace the cover and reconnect the power cords and other cables.

  f. Start the HP NetServer and, if it does not function properly, refer to the following procedures.

The System Will Not Power Up

1. Make sure that the power supply modules are properly seated.
2. Verify that power is available at the AC power receptacle – the green LEDs should be flashing when the power is off and the system is in standby.
3. Verify that the power source is within the specified range.
4. Verify that the AC power circuit breaker is closed.

The System Will Not Boot

1. Inspect the memory board(s). Check that all DIMMs are seated properly.
2. Check that the DIMM configuration on the memory boards matches those allowed. A minimum of one DIMM must be installed.
3. Verify that the memory boards are fully seated. When the memory board is fully seated, the retaining latches are closed (they should be flush with the front of the memory board). With the NetServer powered off, pull out gently on the board to see if the board comes unseated. If it does, reseat the board fully by engaging the retaining latches and closing them fully.
4. Check the boot order with the SCSI configuration utility.
5. Make sure that the server is plugged into to the correct power source.
6. Check that the processors are installed in the correct sockets and that terminator boards are installed in all unused sockets.
7. If the system fails during boot, but without a video display, listen for beep codes to get an error message.
8. If the system fails during boot and presents a POST error code, use the POST error code listing or the Event Log Display to decode the error and get suggested remedies.
9. If the system fails during boot without a clear error message, consider attempting a BIOS recovery.

Intermittent Failures

1. Make sure that the fan modules are fully seated.
2. Verify that the server is plugged into a power source that is within specification.
3. Make sure that the internal SCSI chain is terminated and that termination is not enabled on any of the drives. Note that with LVD SCSI, termination is provided in the cable.
4. Check that the processors are installed in the correct sockets and that terminator boards are installed in all unused sockets.
5. Reseat the main memory DIMMs and I/O DIMMs.

Clearing the System Configuration

You may need to clear the system configuration if a program has corrupted the configuration, or if incorrect settings made in the Setup utility have made the display unreadable.

To clear the system configuration, the procedure is the same for the rack-mount and the pedestal HP NetServers once you gain access to the system board assembly.

1. Log off all users and gracefully shut down the network operating system according to directions in your NOS documentation.

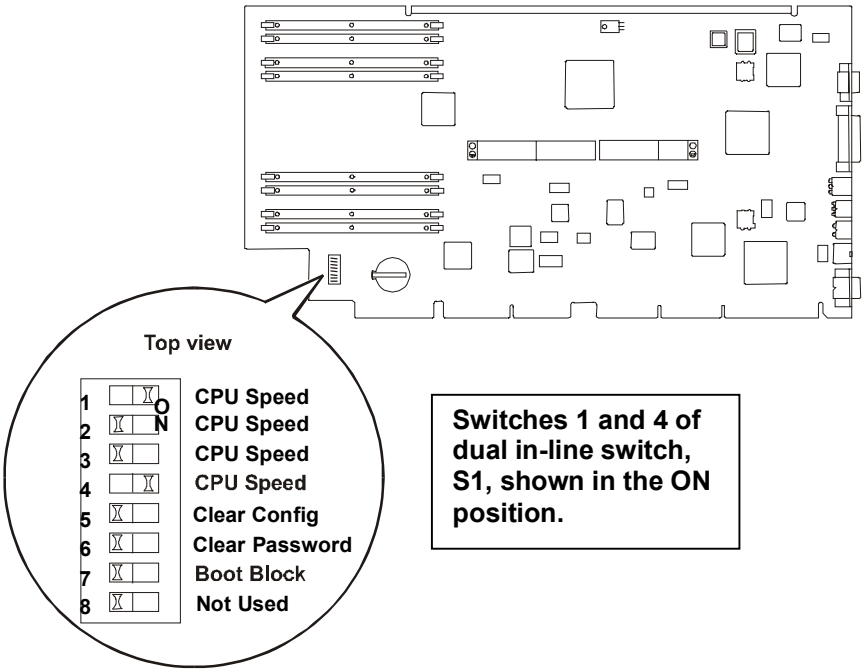
2. Power down the HP NetServer.
3. Disconnect the power cords and cables and, if necessary, label each one to support re-assembly.

CAUTION	The power supplies will continue to provide standby current to the NetServer until the power is disconnected.

4. For both rack-mounted and pedestal models, remove the covers to gain access to the system board assembly.

NOTE	In the LH 6000r, this assembly is under the right cover; in the LH 6000, it is under the top cover.

While you can clear the system configuration in the rack or in the pedestal, it is recommended that you remove the system board assembly to perform configuration changes



System Board Assembly and Configuration Switch

5. Move the configuration switch, switch 5 on the system board, to the "ON = CLEAR CONFIG" position.

6. Plug in the power cords, and turn on power to the HP NetServer. The following message appears:

   ```
   The configuration has been cleared. Set the Clear Config switch to the
   OFF position before rebooting.
   ```

7. Turn off power to the HP NetServer and unplug the power cords.
8. Return switch 5 on the system board to the OFF position.
9. Reconnect cables and power cords to the HP NetServer.
10. Close up the server.
11. Restore HP NetServer to normal operation.
12. Turn on power to the HP NetServer. The error message may be displayed:

    ```
    0012-34:  Incorrect System Configuration
    ```

13. Press the **[F2]** function key and answer **`Yes`** to save the configuration, then exit the Setup utility.

Password Problems

If you have forgotten the password, your HP NetServer will function normally, but you will not be able to change the system configuration settings in the Setup utility.

To reset the password, the procedure is the same for the rack-mount and the pedestal HP NetServers once you gain access to the system board assembly.

1. Log off all users and gracefully shut down the network operating system according to directions in your NOS documentation.
2. Power down the HP NetServer.
3. Disconnect the power cords and cables and, if necessary, label each one to support re-assembly.

CAUTION	The power supplies will continue to provide standby current to the NetServer until the power is disconnected.

4. For both rack-mounted and pedestal models, remove the covers to gain access to the system board assembly.

NOTE	In the LH 6000r, this assembly is under the right cover; in the LH 6000, it is under the top cover.

While you can reset the system password in the rack or in the pedestal, it is recommended that you remove the system board assembly to perform configuration changes.

5. Move switch 6 on the system board (labeled "Clear Password") to the ON position.
6. Plug in the power cords. Turn on power to the HP NetServer and allow it to complete its startup routine. The old password will be erased.
7. Turn off power to the HP NetServer. Unplug the power cords.
8. Return switch 6 to the OFF position.
9. Reconnect cables and power cords to the HP NetServer.
10. Close up the server.
11. Restore HP NetServer to normal operation.

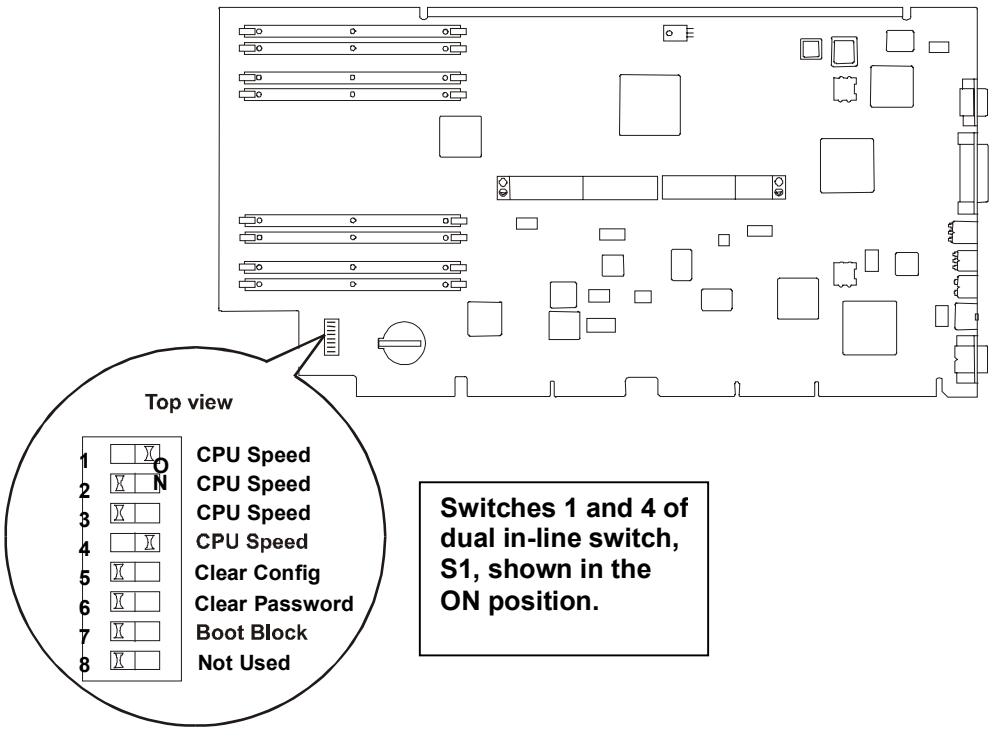
12. If you wish to set the password again, during the power-on system hardware test press the **[F2]** function key to start the Setup utility.
13. Set the new password in the Security menu.
14. Press the **[F10]** function key and answer `Yes` to save the configuration, including the new password.
15. Exit the Setup utility.

BIOS Recovery

If the BIOS becomes corrupted, it is possible to perform a BIOS recovery to correct the condition. A BIOS Update diskette must be created from the HP NetServer Navigator CD-ROM to be used in flashing the new BIOS into the NetServer. To update the BIOS, you enable the Boot Block by setting the Boot Block switch (switch 7) of the configuration switch on the system board assembly to the ON (enabled) position.

To perform a BIOS recovery:

1. Power down the HP NetServer and gain access to the system board assembly.
2. On the system board, set the Boot Block switch (Switch 7), on the configuration switch, from OFF to ON.



System Board Assembly Configuration Switch

3. Replace the system board assembly.
4. Place the previously created BIOS Update diskette into the floppy drive of the HP NetServer and power up the HP NetServer.
5. The flash program on the diskette will re-program the BIOS into the HP NetServer.
6. When the flash programming is completed, power down the HP NetServer.

7. Gain access to the system board assembly and set the Boot Block switch (Switch 7) from ON to OFF
8. Replace the system board assembly in the HP NetServer and replace all covers.
9. Power on the HP NetServer in the normal manner.

Troubleshooting Checklist

These instructions do not generally cover third-party components or devices. Refer to the documentation that comes with the third-party device for diagnostic and troubleshooting information. When replacing the processor or system board, make sure all previously installed components are removed from the original processor or system board and are installed on the replacement board.

NOTE	This information assumes that the customer is booting MS-DOS (note that DiagTools is based on MS-DOS). If the customer is not using MS-DOS, reboot the system with a DOS diskette.

When troubleshooting:

- First make sure that the system is configured properly. Most system problems are the result of incorrect system and SCSI subsystem configurations.
- If it is a network-related error, determine if the user has enough memory and hard disk drive capacity. Run the diagnostics for the network interface cards. Consult with the network operating system manual.
- If it is a hardware error, follow the instructions to log users off the LAN and power down the server. Boot the **Power-on Self-Tests (POSTs)**. If you get an error, look up **Error Messages** for further instructions. If the POSTs pass, you can run the HP DiagTools. Besides the POSTs and HP NetServer DiagTools disk, the standard set of tools recommended for troubleshooting are:
  - **HP NetServer Assistant.** HP NetServer Assistant (NSA) is a customizable software toolset that helps monitor and manage servers over the network from an HP OpenView console. The NSA software has a server part and a management console, or client, part.
  - **TopTools.** HP TopTools provides a set of web-based management tools you can use to maintain and control your HP NetServers running Microsoft Windows NT, Novell NetWare/IntranetWare, or SCO UNIX.
- Always change one component—and only one component—at a time.
- Verify the error.

Check for any general problems:

1. Check that all cables and power cords are firmly plugged into the correct receptacles.
2. Check that all equipment connected to the HP NetServer is turned on.
3. Verify that power is available and is within specification.
4. Check that the HP NetServer is configured correctly in the Setup Utility by pressing **[F2]** during the boot process or by booting the *HP NetServer Navigator CD-ROM*.
5. If the server still doesn't work, turn off the monitor, the server, and all external devices. Note the location of all power cords and other cables before unplugging them. Then:
   a. Remove the cover.
   b. Check that all accessory boards are firmly seated in their slots.

c. Ensure that all mass storage power and flat cables are securely connected.

d. To verify that switches and jumpers on mass storage devices and boards are properly set, see the setup instructions in the mass storage device's manual.

6. Reconnect all cables.
7. Turn on the monitor.
8. Turn on the HP NetServer.
9. Verify the error.

General System Problems

No lights are on and no error message appears.

If the server does not work (no lights are on) and no error message appears, check the following:

1. Make sure that all cables and power cords are plugged into their proper receptacles.
2. Make sure that the AC outlet is working. If the server is plugged into a switched multiple-outlet box, make sure that the switch on the outlet box is turned on.
3. Make sure that the server is turned on (the power-on light should be green and the fans should be on).
4. Turn the server off, wait at least twenty seconds, then turn the server back on to see if the failure can be cleared.
5. Make sure that all boards are installed properly and the processor module or modules are installed in the correct slot. They must be seated firmly in their slots and any cables must be connected firmly.
6. If your server stopped working after you installed a new board, remove the board and turn on the server. If your server now works, determine how to set the jumpers and switches on the board if there are any. If the new board is preventing the server from powering on, it's apt to have a serious electrical problem.
7. If your server still does not work, remove all boards and options that you have installed (do not remove the flexible or hard disk drives) and turn on the server.
8. Add the boards and options one at a time to determine which one is causing the problem.
9. If you have added any memory, make sure that the DIMM modules are seated properly in the board.

Power goes off on the server and doesn't come back on

When certain critical conditions exist, the server shuts down all power.

NOTE It is a good idea to run the Event Log Display Utility on the HP NetServer Navigator CD-ROM as part of regular maintenance procedures so that you can check to see if any problems have been logged to the file. Also, this file needs to be purged at times since the error log can eventually fill up. Errors are time stamped with either a Real-Time Clock (default) or the POST Capture time stamp. See the HP NetServer Navigator CD-ROM, NetServer Utilities menu, for additional information on this feature.

The critical conditions that may shut down the server are:

- critical temperature fluctuations or changes

- voltage problems (external AC line)
- power supply failure

If the server powers off, and **before you try a restart**, do the following:

1. First check to make sure power is getting to the server. Plug a known working device into the power outlet.
2. Access the System Event Log (SEL) through the front panel LCD display. You can do this when the system is running, or you can do this while the system is powered down, but still plugged in (standby mode).
3. Review the **Troubleshooting Checklist** to check for basic server integrity.
4. Check for proper ventilation for the server. The server should have at least six inches of space around the front and back for proper airflow.
5. Check the system specifications and make sure the environmental temperature and voltage are in the specified guidelines.
6. Make sure all system fans are working.
7. Boot the HP NetServer Navigator CD-ROM and run the Error Logging utility. If the system powers up and immediately shuts down, CMOS might be corrupted. You may need to clear CMOS and reconfigure your system.
8. Check the error log and note which errors have occurred that shut down the system.

If you are having voltage fluctuation problems, go to **Power Problems**.

Note that temperature problems can also be caused by a fluctuating power supply.

Monitor the system to make sure you are not experiencing further temperature and voltage problems.

The server stops working (hangs)

If the server stops working, do the following:

1. Review the **Troubleshooting Checklist** before you continue.
2. If the system hangs, power the system off and on, as it is a more complete reset rather than using **Ctrl+Alt+Del**.
3. If the POST find an error, check the connection and/or replace the faulty part.
4. If the problem persists, remove and replace the system board.
5. Once a problem has been found with a part, verify that it is the problem by duplicating the error.

The server powers-off then powers on again by itself

The server has an Automatic Server Restart (ASR) feature that is set to enabled. The ASR feature is used with the NetServer Assistant product. When certain conditions occur the server shuts down all power, then twenty seconds later restarts the server. ASR is enabled as the default. You can disable this feature if you want. To read about the effects of automatic server restart, see the NetServer Assistant product. The conditions that shut down and restart the server are operating system problems that affect the system timers.

The system does not start (boot)

Check that DIMMs are installed on the System Board. If the above are fine, do the following:

1. Review the **Troubleshooting Checklist** before you continue.
2. If memory problems are being experienced:
   a. Power the system off and on as it is a complete reset instead of using **Ctrl+Alt+Del**.

b. If the POST finds a problem, check the error against the **Error Messages** and correct the problem.

3. Check that all DIMMs are installed correctly:
   a. Check that the DIMMs comply with the **Memory Guidelines**.
   b. Reseat the DIMMs on the system board.
4. To check that the system board is installed and configured correctly:
5. If the HP NetServer indicates there is not enough memory, and if the customer does not want to add memory, try these steps:
   a. Disable any drivers that are not necessary for the application being run, and/or the network.
   b. Delete memory resident or TSRs (terminate and stay resident) programs.

To solve the problem with steps 5a-5b, the customer must be willing to give up functionality in exchange for more memory.

6. For memory conflicts (two boards or drivers are trying to use the same memory addresses), change the addresses used by the memory

   For information about the board addresses, see the Setup Utility.

7. Once a suspect part has been found, verify that it is the problem by reinstalling the part and duplicating the error.

Memory Problems

The memory modules are DIMMs. Note that some HP NetServers require that memory must be installed only in certain sockets or banks, sometimes in multiples (for example, 2 or 4 at a time).

NOTE	If the **POSTs** (displayed at power-on time) indicate a defective memory module. Replace the defective module.

1. Review the **Troubleshooting Checklist** before you continue.
2. If memory problems are being experienced, power the system off and on. This performs a "cold" restart, rather than a "warm" restart (as it does when you press **Ctrl+Alt+Del**).
3. Check the System Event Log for messages indicating memory errors.
4. Run the **DiagTools** memory test.
5. Reseat the DIMMs.
6. To check that the modules are installed and configured correctly:
   a. Run the Setup Utility and check the configuration.
   b. Install one known good DIMM. If you still receive an error, replace the system board.

      If the error goes away, add another DIMM and reboot again. Continue this process until you have installed all DIMMs or you experience a failure.

      Replace the defective DIMM.
7. Once a suspect part has been found, verify that it is the cause of the problem by reinstalling the part and attempting to duplicate the error. Also install it in another memory socket to confirm whether or not the socket is defective.

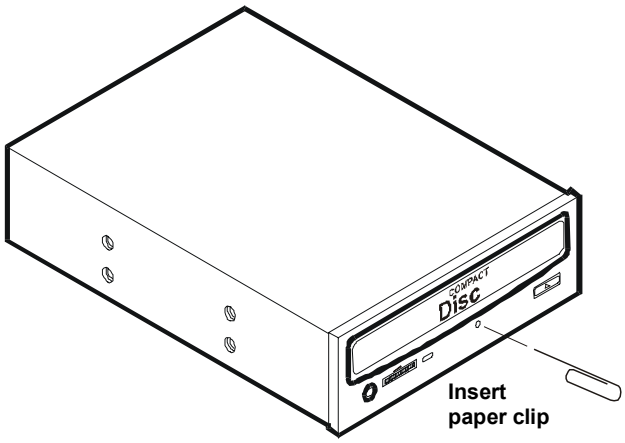
CD-ROM Problems

Symptoms:

The CD-ROM drawer will not open.

If the CD-ROM drawer fails to open when you press the Eject Button or with software commands, do the following:

1. Turn off all power to the computer.
2. To open the drawer, insert a pointed object, such as a paper clip, into the emergency eject hole and push in about 1.75 inches (40 mm).



3. Remove the disk and close the drawer.
4. After you remove the disk, start the computer and try to open the drawer again with the Eject Button or software commands.
5. If the drawer still will not open, replace the CD-ROM drive with a working unit.

The CD-ROM drive is not working properly.

If the CD-ROM drive does not work, do the following:

1. Review the installation guidelines in Chapter 2 to ensure a proper configuration.
2. In addition, check the following:
   - ◊ Check that the correct drivers are installed.
   - ◊ Check that there is a CD-ROM disk in the CD-ROM drive.
   - ◊ Check that all internal drive cables are securely attached and functional.
3. If the drive is a Hewlett-Packard CD-ROM, review the *CD-ROM Installation Guide* for any special installation instructions.
4. Try installing a known good CD-ROM drive
5. If the problem persists, check for environmental problems that can damage disk media and disk drive heads. Environmental problems result from:
   - ◊ Radiated Interference: Sources include communications and radar installations, radio/TV broadcast transmitters, and hand-held receivers.
   - ◊ Airborne Contaminants: Sources include dust, smoke, and ashes. Steam from duplication equipment may result in intermittent disk errors.

The NetServer won't boot from the CD-ROM.

Use the Setup Utility to make sure the CD-ROM drive is bootable:

1. Review the **Troubleshooting Checklist** and **Boot Device Priority** before you continue.

   ```
   Press <F2> to enter SETUP or <ESC> to enter Boot Menu
   ```

2. Press the Esc key. At the end of the Power-On Self-Test, a menu appears that looks something like this:

   ```
   1. ATAPI CD-ROM Drive
   2. Removable Device
   3. Hard Drive
   4. Enter Setup Utility
   ```

3. Use your keyboard's arrow keys to select the boot device. Then press the Enter key. The system continues its startup sequence and boots from the device you selected.

Flexible Disk Drive Problems

Symptoms:

There are lost clusters.

There are read/write errors.

The system will not start from a diskette.

If you cannot boot from, write to, or format the flexible disk, do the following:

1. Review the **Troubleshooting Checklist** and read about **Boot Device Priority** before you continue.
2. Try booting from a known good flexible disk.
3. Check to see if boot from CD-ROM is enabled and if there is a bootable CD in the CD-ROM drive.
4. Select the Setup Utility (press **[F2]** during the boot process and check that the system's mass storage configuration is correct. If for some reason you cannot run the Setup, you can clear CMOS and reconfigure the server.

   Try to reboot.
5. If you cannot format or write to a flexible disk:
   - ◊ Verify that the diskette is not write protected.
   - ◊ Check that the disk drive is properly configured with the Setup utility. Make sure that "Start from Flexible Disk" option is disabled.
6. Check that all internal drive cables are securely attached and functional. Inspect the cables and reseat the connectors at both ends.
7. If the cables are securely attached, and the drive still does not work, replace the cables with known good cables, one at a time.
8. If the problem persists, and/or there is an error code, replace the faulty part (the drive, the system board, etc.)
9. If the problem persists, check for environmental problems that can damage disk media and disk drive heads.

Environmental problems result from:

- Radiated Interference: Sources include communications and radar installations (such as at an airport), radio/TV broadcast transmitters, and hand-held receivers.
- Airborne Contaminants: Sources include dust, smoke, and ashes. Steam from duplication equipment may result in intermittent disk errors.

Keyboard and Mouse Problems

Symptoms:

The keyboard does not work.

A character is not displayed when a key is pressed.

1. Review the **Troubleshooting Checklist** before you continue.
2. Make sure that the keyboard is not locked.
3. Make sure that the keyboard cable connections at the rear of the server and at the back of the keyboard are securely and correctly attached.
4. If a keyboard/monitor switchbox is used with this HP NetServer, plug the keyboard directly into the keyboard port of the HP NetServer. Verify the problem.
5. If the problem persists, turn off the server and back on by using the power button.
6. Try replacing the keyboard with a known good keyboard.
7. If the problem persists, check the keyboard cable for continuity, or try a known good cable.
8. If the problem persists, replace the system board.

The mouse does not work or is intermittent.

The HP NetServer automatically detects a mouse when one is installed. If the mouse or other input device is not working, perform the following:

1. Review the **Troubleshooting Checklist** before you continue.
2. Check that the mouse cable is properly and securely connected to the NetServer.
3. If a keyboard/monitor switchbox is used with this HP NetServer, plug the mouse directly into the keyboard port of the HP NetServer. Verify the problem.
4. Verify that the mouse's port does not have a resource conflict. Use the Setup Utility (press **[F2]**).
5. Verify that the correct mouse driver has been installed onto the boot drive. Refer to the mouse installation manual or the operating system manual.
6. Replace the mouse with a known good unit.
7. If the problem persists, replace the system board.

Network Interface Card Problems

See the appropriate Network Interface Card documentation.

Symptoms:

The adapter can't connect to the network.

1. Make sure the cabling is installed properly.

   Most hub and switch connections require straight-through cable; consult their documentation. If you're directly connecting two computers (with no hub or other device), use a “crossover” cable.

2. Verify that there are no resource conflicts between the NIC and any other accessories in the HP NetServer. Check the Setup Utility.
3. Check any LEDs on the adapter at the back of the computer to see if they show activity. No activity on the LEDs probably indicates a bad network cable, hub connection or other network error.
4. Make sure you're using the latest and correct drivers. Make sure the drivers are intended for this adapter.
5. Make sure the port on the switch or hub (or other device) has the same duplex setting as the adapter.

   If you configured the adapter for full duplex, make sure the switch port is also configured for full duplex. Setting the wrong duplex mode can degrade performance, cause data loss, or result in lost connections.

6. Test the adapter as directed in the installation tasks for each operating system. Also check the “README” files on the support disk.

Power Problems

Symptoms:

A fan is not working.

The power LED does not light.

1. Review the **Troubleshooting Checklist** before you continue.
2. Verify that the AC power source is good:
   a. If the system fans are audible or a control panel light is on, the power is on.
   b. Verify the circuit breaker for the AC power outlet.
   c. If the breaker was off, check that all devices connected the HP NetServer share the same circuit breaker and are the only devices on it. Reset the circuit breaker after reconfiguring the devices, if need be.
   d. Verify that the AC power outlet is not faulty. Test it by plugging in a known-good device.
   e. Verify that the third-wire ground is isolated from other grounds and is at ground potential.
3. Verify all cable connections:
   - AC power cords from AC source outlet to server.
   - DC Power supply cables to all HP NetServer PCBs
   - DC power supply cables to disk drives and/or mass storage cages
4. If the fans aren't audible and the above steps are verified, check that power is getting to all fans. HP NetServers have multiple fans. All fans run when power is turned on; all are off when power is off.

   With the power supply connected to the system board, check the power supply's voltages.

5. If voltages are not present:

a. Turn off AC power.

b. Disconnect the power cords for 10 minutes in order to reset the power supply's circuitry.

c. Turn on AC power again.

If power is still not getting to the system board, replace the power supply (or power supply module on some HP NetServer models).

6. If power is getting to the fan but the fan isn't working, replace the fan (or replace the power supply in HP NetServer models with fans incorporated in the power supply).
7. If the problem continues, replace the power supply module.
8. If, after replacing the power supply, the problem persists:

   a. Remove all accessory boards, including any hard disk drive controller board or the video board the customer might have installed, and reboot the system.

   b. Disconnect all mass storage power cords and cables (except those to the boot device) and reboot the system.
9. If the problem goes away, reinstall the original suspected part to verify that it is causing the problem.

SCSI Subsystem Problems

Symptoms:

The external SCSI subsystem does not work after installation.

If the external SCSI subsystem does not work after installation, do the following:

1. Review the **Troubleshooting Checklist** and read "Mass Storage Guidelines" section in Chapter 2.
2. Run the **DiagTools** and verify the integrity of the SCSI buses, and other switch settings on the external storage devices are correct. Verify that each SCSI device is assigned a unique SCSI ID.
3. Refer to the documentation that came with the SCSI devices for any specific information on installing them.
4. Make sure that any installed SCSI controller is installed and configured correctly.
5. For any SCSI devices installed in an enclosure external to the HP NetServer chassis, make sure that Ultra SCSI is disabled on this controller. SCSI devices external to the HP NetServer chassis are supported in Fast SCSI mode only.
6. Check the SCSI cables for problems that may have been caused by recent computer maintenance, hardware upgrades, or physical damage.
7. Check the ROM BIOS version to make sure it is the most recently issued version. Booting the most recent version of the *HP NetServer Navigator CD-ROM* will automatically report if the BIOS is not current and needs updating (“flashing”). Follow the instructions in the screen to update the BIOS.
8. Check that the external SCSI subsystem BIOS is being executed properly.

   ◊ When you start the server, the incrementing count of the RAM appears on the screen. Then the external SCSI BIOS displays a banner and a copyright notice.

   ◊ The BIOS then checks for valid devices on the SCSI bus, and reports which devices are found. If you have installed and configured the SCSI devices correctly, you will see a list confirming all SCSI devices installed in the system.

- ◊ If the banner is not displayed the external SCSI controller is not recognized.

9. Verify that the SCSI bus is terminated at both ends. By default, HP SCSI controllers are terminated. When a device is connected to a connector on the controller, bus termination for that connector is disabled. Verify that the last device on the bus is terminated.

NOTE	When using LVD SCSI (often referred to as Ultra2 SCSI), termination is typically provided at the controller and the far end of the cable.

10. Make sure that no device is set to SCSI ID7; this is the SCSI ID used by the SCSI controller.
11. Verify that all SCSI devices are all LVD (low voltage differential) SCSI and that no SE (single-ended SCSI devices have been added). Note that SE devices will work on and LVD bus, but performance will be degraded.
12. Verify that the SCSI hard disk drive that loads the operating system is set to the lowest SCSI address (usually set to 0).
13. Go into the SCSI Configuration Utility and set the transfer rate lower. The internal and external SCSI subsystems are typically LVD and will be set to default at the maximum 80 MB/sec. If the SCSI system works at lower transfer rate, you may infer a connector problem. Try cleaning and reseating the SCSI cable. Try another cable.

    To change the transfer rate for a SCSI device:

    a. Press **[CTRL]** and **[C]** keys when prompted to enter the SCSI utility.

    b. Select the either the internal or external SCSI controller. The internal SCSI channel is usually port 2000. Press **[Enter]**.

    c. After the utility scans the channel, it will list SCSI devices detected. You may change the transfer rate for a specific device by selecting it, or for the entire channel by changing the controller. Make your selection and press **[Enter]**.

    d. Press **[Enter]** on Sync Rate to select a new transfer rate.

    e. Follow the prompts to save the new setting and exit the utility.

14. If a second hard disk drive is connected to the SCSI cable, check it for proper SCSI address, SCSI cable connection, proper power, and jumper settings.
15. Disconnect all SCSI devices except the integrated SCSI adapter and the drive at SCSI address 0, and try again. If this fails, try substituting a known good SCSI adapter board and a good hard disk drive.

The SCSI BIOS has trouble loading.

If the server has trouble loading the SCSI BIOS, do the following:

1. Review the **Troubleshooting Checklist** before you continue.
2. If you installed more than one SCSI controller, make sure that the BIOS for all controllers except for the boot controller are disabled. This lets the SCSI BIOS for the boot controller load.
3. Determine what the boot device priority is for the HP NetServer model. Verify that the boot device is set to the correct priority.

The SCSI subsystem does not work at installation.

Many SCSI problems are caused by an incorrect configuration rather than by faulty hardware. If the SCSI subsystem does not work after installation, do the following:

1. Review the **Troubleshooting Checklist** and "Mass Storage Guidelines" section in Chapter 2 before you continue.

2. Run the **DiagTools** and verify the integrity of the SCSI buses, and other switch settings on the external storage devices are correct. Verify that each SCSI device is assigned a unique SCSI ID.
3. If you don't see the SCSI BIOS banner during system start:

   "Symbios, Inc. SDMS TM V4.0 PCI SCSI BIOS PCI Rev. 2.0, 2.1"
   "Copyright 1995, 1998 Symbios, Inc."
   "PCI-4.14.04"

   and the final message "SCSI BIOS successfully installed" after devices are displayed:

   - Check the cable connections.
   - Check the SCSI termination.

4. Run the Setup Utility or SCSI Configuration Utility and verify that the SCSI host bus adapter (HBA) is properly configured.

   The HBA is usually SCSI ID 7.
5. If you installed more than one SCSI adapter, verify that each adapter is set to a separate BIOS address; or disable the BIOS on all of the adapters except one.
6. For each device, check:

   - That each device has a unique SCSI address.
   - In general, when selecting an address for a drive (default address is 0), select the lowest possible address.
   - Check that the device's jumpers are set according to the device documentation.

7. Check that the primary SCSI hard disk drive is set to the lowest address (usually set to 0). Each device (the HBA is also a device) must have a unique and separate SCSI ID number. To solve this problem, simply set the device ID to something other than that of the HBAs SCSI ID (7). If the device is a boot drive, then the SCSI ID should be set at 0.
8. Go into the SCSI Configuration Utility and set the transfer rate lower. The internal and external SCSI subsystems are typically LVD and will be set to default at the maximum 80 MB/sec. If the SCSI system works at lower transfer rate, you may infer a connector problem. Try cleaning and reseating the SCSI cable. Try another cable.

   To change the transfer rate for a SCSI device:

   a. Press **[CTRL]** and **[C]** keys when prompted to enter the SCSI utility.
   b. Select the either the internal or external SCSI controller. The internal SCSI channel is usually port 2000. Press **[Enter]**.
   c. After the utility scans the channel, it will list SCSI devices detected. You may change the transfer rate for a specific device by selecting it, or for the entire channel by changing the controller. Make your selection and press **[Enter]**.
   d. Press **[Enter]** on Sync Rate to select a new transfer rate.
   e. Follow the prompts to save the new setting and exit the utility.

9. If another hard disk drive is connected to the SCSI bus, check it for unique address, SCSI cable connection, and power connection.
10. Check the SCSI bus cable for correct orientation, alignment, and seating on the SCSI adapter and the SCSI device.
11. Check for the correct Hewlett-Packard internal and external SCSI cables.

12. Check that all SCSI devices are connected to power and power-on all SCSI devices before or at the same time as the HP NetServer to ensure a stable SCSI bus.
13. Watch the boot screen for all SCSI devices to be displayed. For example, in a system with 1 SCSI controller and 2 hard disk drives (one with ID 0 and one with ID 1), if a valid device is found at device address 0, but not at address 1, you would see these device validation lines on the boot screen:

    ```
    Channel x, SCSI ID #n - id info - Drive C: (80h)
    ```

    If you see this message:

    a. Verify that the SCSI hard disk drive is set to address 1.
    b. Check the SCSI bus cable for correct orientation, alignment, and seating on the host adapter and the hard disk drive.
    c. Verify that terminators are installed at each end of the SCSI bus, but not on any other devices. The hot swap cage printed circuit board has automatic termination that disconnects when a cable is attached.
    d. Verify that all SCSI devices on the bus are appropriate for that bus (only single-ended SCSI devices on the single-ended bus, only differential SCSI devices on the differential bus).
14. If the server still fails to recognize the SCSI drive, disconnect all SCSI devices except the host adapter and the drive at SCSI address 0 and try again. If the system fails, try substituting a known good hard disk drive.
15. If the SCSI BIOS has properly identified device 0 and has installed it as drive C, but cannot find a device at address 1, and in addition, if no further messages are displayed, it indicates the server cannot load the operating system from device 0, check the following:

    a. If a second hard disk drive is connected to the SCSI bus, check it for proper address selection, SCSI cable connection, and proper power.
    b. Check the disk partition.
    c. Partition the hard disk drive if required.
16. Use only SCSI devices without built-in terminators.

    The HP NetServer embedded controllers are terminated automatically on the hot swap cage or at the end of the SCSI cable. If you are installing a SCSI device that uses a built-in terminator, you must remove the terminator from the device before proceeding with the installation.

    Use only the HP NetServer SCSI cables for the SCSI hot swap subsystem.
17. Check that all SCSI devices LVD (low voltage differential) SCSI and that no SE (single-ended) SCSI devices have been added to the bus.

    Hot-swap drives shipped by HP are set for LVD operation. Drives set for SE operation may used, but they will slow down the transfer rate considerably. Please refer to the user documentation for the device to determine which device you are using.

CAUTION	Don't use high voltage differential SCSI devices, they can destroy circuitry on LVD and SE devices.

18. Disconnect all SCSI devices except the SCSI adapter and the drive at SCSI address 0, and try again. If this fails, try substituting a known good SCSI adapter and disk drive.
19. Use the Setup Utility to check for resource conflicts, especially if new boards or accessories have been added.

The SCSI subsystem stops working.

If the SCSI subsystem should stop working, do the following:

1. Review the **Troubleshooting Checklist** and "Mass Storage Guidelines" in Chapter 2 before you continue.
2. Run **DiagTools**. Verify that the SCSI ID and other switch settings are correct and get specific information or verification that the problem is the SCSI bus.
3. If an accessory board was added recently, check if there is a resource conflict between the new board and an existing accessory board. Also, if you have changed the options on an existing board, there may be a resource conflict.
   a. Remove the new board and restart the computer. If this corrects the problem, the board is either defective or it is trying to use a system resource used by the SCSI subsystem.
   b. Check if the board is using memory, I/O addresses, or interrupt lines that are also used by the SCSI subsystem.
4. Check to see if there have been recent changes to any software. For example, has anyone moved, removed, or changed the configuration files or drivers? Refer to the software documentation for more information.
5. Check the SCSI cables for problems that may have been caused by recent computer maintenance, hardware upgrades, or physical damage.
6. If you suspect hardware failure and there are no system error messages, check each component associated with the failure. Equipment failure is probably the most unlikely reason for a SCSI subsystem failure.
7. Check the ROM BIOS version associated with the SCSI controller to make sure it is the most recently issued version.

Video/Monitor Problems

Symptoms:

Nothing is displayed on the monitor.

The monitor is blank and the computer beeps.

The wrong size characters appear on the monitor.

Colors are wrong or there are no colors on the monitor.

If you installed a video board and are not using the built-in video system, go to Step 12.

If you have two video monitors connected, test the monitors to make sure they are working (Step 1-4) then go to Step 10.

NOTE	The system BIOS will beep if no video hardware is detected. This happens when the on-board video is disabled and there is no video adapter board installed.

1. Review the **Troubleshooting Checklist** before you continue.
2. Check the contrast and brightness controls to make sure they are adjusted.
3. Verify the video and power cords are connected to the monitor.
4. Make sure there is adequate power:

a. Check that the display power switch is turned on.

b. Check that the display power cord is connected to an AC power outlet and the video cable connected to the server's video connector.

c. Plug in a known working device to make sure there is power to the outlet or use the proper testing device to check the power outlet.

d. Turn the monitor off and on, and if the monitor has a power LED, see if it lights.

e. Turn the Clear Configuration switch on the system board to OFF and reboot the system. Check if the problem persists.

5. Turn on the HP NetServer and wait a full 2 minutes. Check that the monitor starts displaying normally.

6. If the problem persists, and if the power cord is detachable, try a known good power cord.

7. Unplug the power cord and wait 30 seconds. Plug in the power cord and turn on the HP NetServer. Wait a full 2 minutes. Check that the monitor starts displaying normally.

8. Check the monitor display to see if the system memory count takes place correctly.

   a. Turn the server off and then on. Check to see if the memory is counted during the server boot. If no count occurs, go to Step 10.

   b. Check to see if the count occurs in the color appropriate for the monitor.

   If the count occurs in the wrong color, the problem may be with the video subsystem, the monitor, or the monitor cable. (Continue with the troubleshooting steps.)

9. If you are using a video screen saver utility and the screen goes blank while using the keyboard, you may be using an application that turns off the screen even when you are using the keyboard. Refer to the manual that came with the screen saver utility.

10. Make sure the memory modules (DIMMs) are correctly seated in their slots. You may want to remove and reinstall the memory modules to make sure that they are not causing the problem. Verify that the correct type, size, and combinations of modules for this model HP NetServer are installed.

11. To see if the display is functioning:

    a. Turn off the monitor and the server.

    b. Disconnect the video cable from the video connector.

    c. Turn on the monitor.

    Monitor Notes:

    - When most EGA and VGA monitors are disconnected from the video connector, if the monitor is working, the screen is white.
    - When some monitors (such as HP high-resolution monitors) are disconnected from the video connector, the monitor may be working, although the screen is black.
    - If the display is black or white when it should be in color, check the monitor cable to see if a pin is bent. If a pin is bent, slowly but carefully straighten the pin. Replace the cable if the pin cannot be straightened successfully.
    - If a monitor tester is available, use it to check the display.
    - If you suspect the monitor is faulty, replace it with a known good monitor. Then reinstall the original monitor and duplicate the error.

12. Verify that the monitor is working by plugging it into a know-good HP NetServer or computer.

13. Check to see if the monitor connector's pins are bent. If the pins are bent, slowly but carefully straighten them.
14. Connect the monitor cable to the HP NetServer video connector and turn on the HP NetServer. If there is a display, but characters are the wrong size or the display is the wrong color:
    a. Check whether the monitor is a color or monochrome monitor.
    b. Check that the video cable is properly inserted in the connector on the back of the computer.
    c. Check for bent pins on the connectors.
15. If the customer has installed a video board instead of using the built-in video, make sure all jumpers and switches are set properly on the installed video board. (See the manual for the video board.)
16. If the monitor displays a badly scrambled image that looks to be the current screen image, then the monitor is not synchronizing correctly.
    - If a video board is installed, replace it with a known good one. The video timing setting on the board may be bad.
    - If it is the on-board video, replace the system board.
17. If a video board is installed and the built-in video is used:
    a. Make sure the video board/built-in video combination is supported. Usually, two video systems (for example, internal video and a video adapter board) cannot be used at the same time.
    b. If there is still a problem, make sure the board is seated correctly.
    c. If there is still a problem, remove the video adapter board, and enable the internal video system. Verify the problem.
18. If a message appears such as "INVALID CONFIGURATION", run the **Setup Utility** and press **[F2]** during the boot process or boot the HP Navigator CD-ROM) to confirm the server video configuration. Make sure other accessory boards do not use the same memory addresses as the HP video system.
19. If the problem is isolated to the built-in video system, replace the system board.

Configuration Problems

Symptoms:

An installed driver cannot find a PCI board.

Installing a PCI board which bridges the two system PCI buses (certain adapter boards provide this feature) can cause previously installed PCI drivers to not recognize their adapter board(s).

To resolve the configuration problem, move the PCI board that has bridging capability to a primary PCI slot.

The configuration cannot be saved and the battery loses power.

Refer to this section if the server frequently loses date and time that may be caused by the battery losing power.

1. Review the **Troubleshooting Checklist** before you continue.
2. If the system frequently loses the time and date, replace the battery. The battery is attached to the system board.
3. Set the new date and time, and reset the configuration parameters using the Setup Utility, if necessary.

4. Turn off AC power to the HP NetServer, then reboot to see if the date and time was saved.
5. If date and time are still requested, and the battery is good, perform the next procedure.

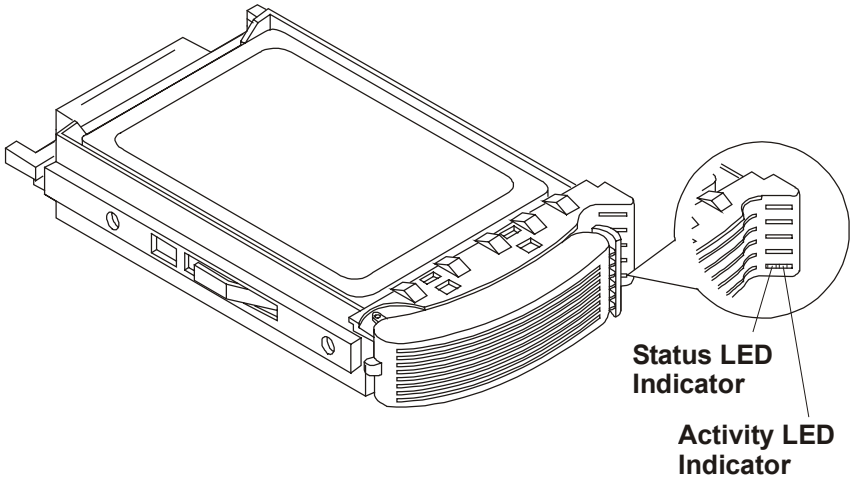
The configuration information is frequently lost and the battery is good

If the battery is good and you cannot save system configuration, do the following

1. Review the **Troubleshooting Checklist** before you continue.
2. Configuration information is saved in the CMOS. If you continue to loose configuration information and the battery is good, or you cannot save the information to the CMOS:
   a. If possible, using the configuration utility, save the current configuration to a diskette.
   b. Replace the system board.

Verifying Hard Disk Drive Operation

Each Ultra2 hard disk drive module has two LED indicators on its front, one for status and one for activity.



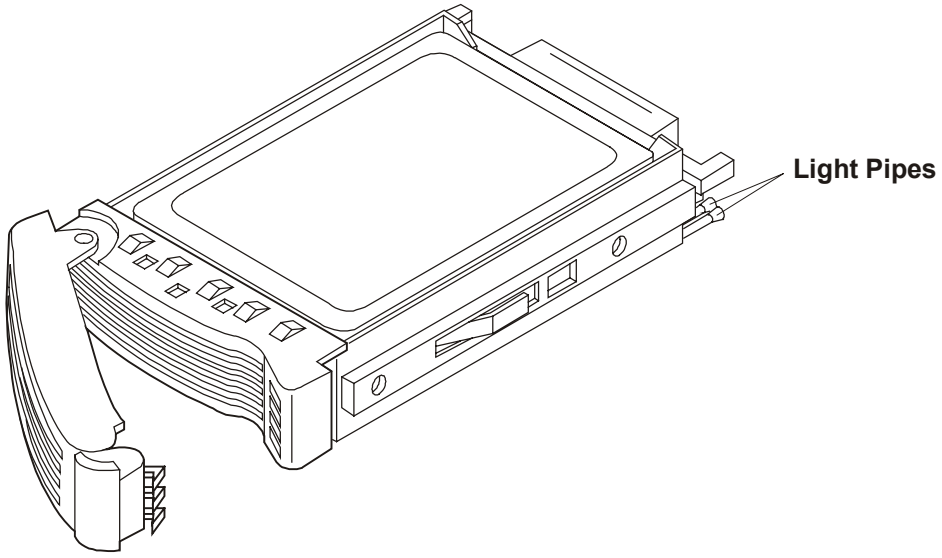
LED Apertures on Ultra2 Hard Disk Drive Module

Light pipes on the module transmit light to these apertures from LEDs on the inside rear of the hot-swap mass storage cage. Verify that the LEDs show the correct status and activity indications for all disk drive modules that you installed:

1. Turn on power to the HP NetServer and display monitor.
2. During the Power on Self-Test (POST) early in the boot sequence, watch the two LEDs on each hard disk drive module.
   - ◊ **Status LEDs:** All LEDs quickly cycle from amber to steady green.
   - ◊ **Activity LEDs:** All LEDs quickly cycle from amber to green. The LED stays steady green until the drive spins up.
3. If no LEDs were illuminated on any disk drive modules, the power harness may not be correctly connected. Check it as follows:
   a. Turn off the HP NetServer power switch and unplug the AC power cords and any telephone cables. Remove the fan assemblies.
   b. Disconnect the P2 connector of the power harness, and then reconnect it.
   c. Replace the fan assemblies. Reconnect the AC power cords and any telephone cables.

d. Restart the HP NetServer to determine whether the LEDs now become illuminated during the POST. If not, contact your reseller.

4. If one or both LED indicators on a single module are not illuminated during the POST, the module may be installed incorrectly, or its light pipes may be damaged.



LED Light Pipes on Ultra2 Hard Disk Drive Module (Shown for Low-Profile Disk Module)

Check the light pipe on the module as follows:

a. Remove the disk drive module.

b. Inspect the light pipes for damage. If a light pipe is damaged, contact your reseller.

CAUTION	The light pipes are fragile. Be careful not to damage them when you inspect them or when you reinsert the module.

c. Reinstall the disk drive module.

d. Restart the HP NetServer to determine whether the LEDs become illuminated during the POST now. If not, contact your reseller.

Processor Problems

Certain HP NetServer modules contain diagnostic LEDs that indicate memory errors, processor module errors, or processor voltage regulator module (VRM) errors.

1. Remove and reseat the processor module(s).
2. Remove and reseat the VRM(s).
3. Verify that the processor speed switches are set correctly.
4. Replace each of these components, one-at-a-time, with a known-good one, and retest the system:
   - VRM
   - Processor
   - Processor board (if so equipped)

CAUTION	Do not push on any components on the VRM; push on the edge of the main board only. Pushing on this device may break it.

If the fault persists, replace the system board.

Printer/DataComm Problems

Symptom:

A printer does not print or DataComm devices are not working.

If the printer does not work, or the DataComm devices are not working, do the following:

1. Review the **Troubleshooting Checklist** before you continue.
2. Verify the correct cables have been used, the cables are connected properly, and the cable pins are not bent.

   Check the cable for continuity, or try a known good cable. Refer to the peripheral's manual.
3. Verify that the AC power cord is plugged into the power source and the printer.
4. Make sure that the printer power switch is on.
5. Make sure that the AC outlet is working. If the printer is plugged into a multiple-outlet box, make sure the switch on the outlet box is turned on, and the circuit breaker (if equipped) is not tripped.
6. Make sure that the printer is on-line.
7. Examine the printer for a paper jam.
8. Run the printer internal self-test (if it has one) to make sure that the printer is functional. Refer to the printer's manual for instructions.
9. Make sure that you have selected the correct port setting when you configured the printer. The printer must be configured correctly for the server and for the application. You may need to change some switch settings on the printer.
10. Make sure that you have not disabled the I/O ports. Run the Setup Utility (press **F2**during the boot process) and verify the I/O port status.
11. Make sure the server's printer port is working properly by running another peripheral from that port.
12. If the printer still does not work, it may have a resource conflict with another board or accessory. Remove boards and accessories (except the hard disk drive) one at a time to isolate the conflict. Check the printer for proper operation after you remove each board or accessory.
13. If an error message appears on the screen, refer to **Error Messages** and the printer's manual for help.
14. If the system was working before you installed the accessory, remove the accessory and restart the system.
15. If the problem persists, replace the system board.

6 Replacing Parts

Safety Information

Follow the procedures listed below to ensure safe handling of components and to prevent harm to both you and the server:

- Use an anti-static wrist strap and a grounding mat, such as those included in the Electrically Conductive Field Service Grounding Kit (HP 9300-1155).
- Handle accessory boards and components by the edges only. Do not touch any metal-edge connectors or any electrical components on accessory boards.
- Do not wear clothing subject to static charge build-up, such as wool or synthetic materials.

WARNING	Hazardous voltages are present inside the server. Always remove AC power from the CPU and other associated assemblies while working inside the unit. Serious injury may result if this warning is not observed.

Service Tools Required

Service of this product may require one or more of the following tools:

- Electrically Conductive Field Service Kit (P/N 9300-1155)
- CE Peripheral Exerciser Disk Kit (45935-63210)
- DataComm Test Hood, 9-pin (24540-60010)
- DataComm Test Hood, 25-pin parallel (24540-60011)
- 1/4 inch Flat Blade Screwdriver
- ACX-15 Torx® Screwdriver

Replacing Power Supply Module(s)

The low voltage ON/OFF switch on the front panel controls the power supply.

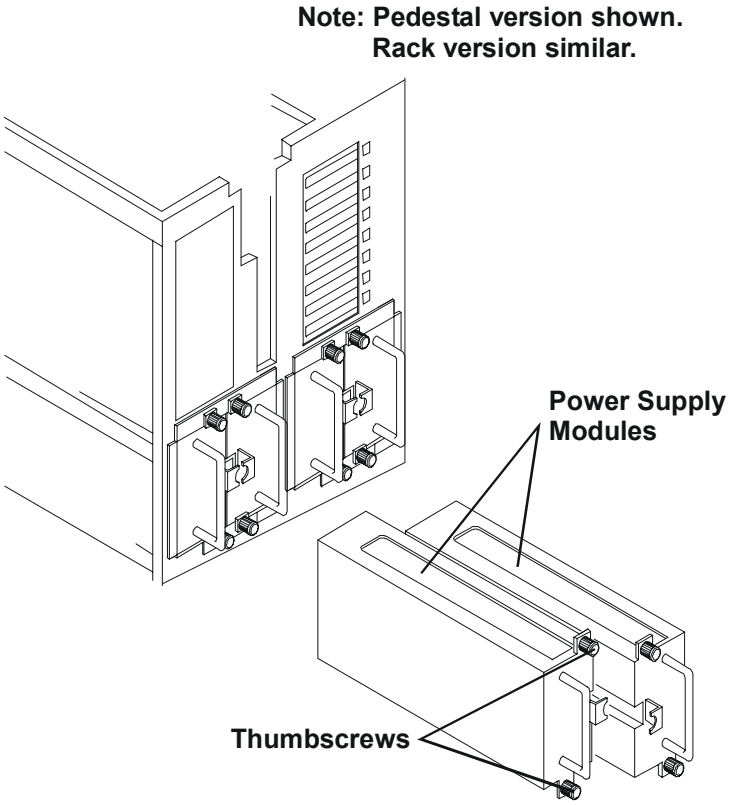
CAUTION	Power redundancy requires four power supply modules. No redundancy is available with three modules.

If there are four power supply modules installed, the failed module may simply be removed without turning off AC power. If only three modules are installed, and one module must be replaced, you must first turn off AC power.

To replace the power supply:

1. Back up the hard disk drive(s) and save the configuration.
2. If necessary, shutdown the network operating system (see caution above).
3. Turn off the HP NetServer (if required; see caution above) and display.
4. Disconnect all telephone cables and power cords (if required; see caution above).

5. Unscrew the two thumbscrews on the power supply module and, using the handle, pull the module from the power supply cage.



Removing the Power Supply Modules

6. Slide the new power supply module into the power supply cage.

CAUTION	Do not slam the power supply into the cage; insert it slowly, and push firmly only when you feel resistance. Excessive force may damage connectors on the power supply cage or the module.

7. Tighten the two thumbscrews on the module.
8. Connect all telephone cables and power cords.
9. Turn on the HP NetServer and display.

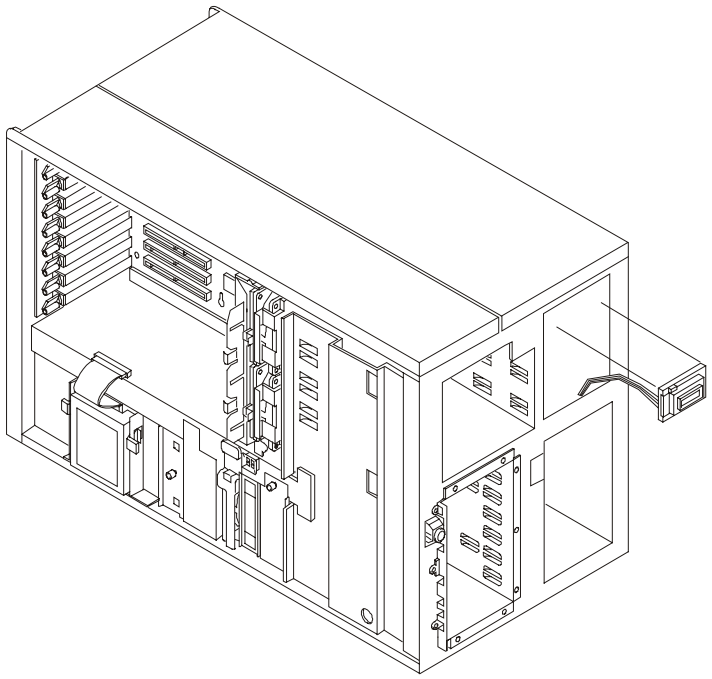
Replacing the Control Panel

The control panel contains power, keyboard lock, and reset buttons, as well as the LCD and status LEDs.

NOTE	The orientation of the control panel is different on the pedestal version and the rack-mounted version.

To replace the control panel:

1. Back up the hard disk drive(s) and save the configuration.
2. If necessary, shutdown the network operating system.
3. Turn off the HP NetServer and display.
4. Disconnect all telephone cables and power cords.
5. Remove the right side cover (pedestal version) or the bottom cover (rack-mounted version).
6. Unhook the control panel cable from the I/O board.
7. Remove the two screws securing the control panel to the chassis.
8. Remove the control panel from the HP NetServer by guiding the cable out through the hole in the chassis sheet metal.



Control Panel Assembly Removal

Install the replacement control panel assembly by reversing the removal procedures.

Replacing the HP NetRAID DIMM

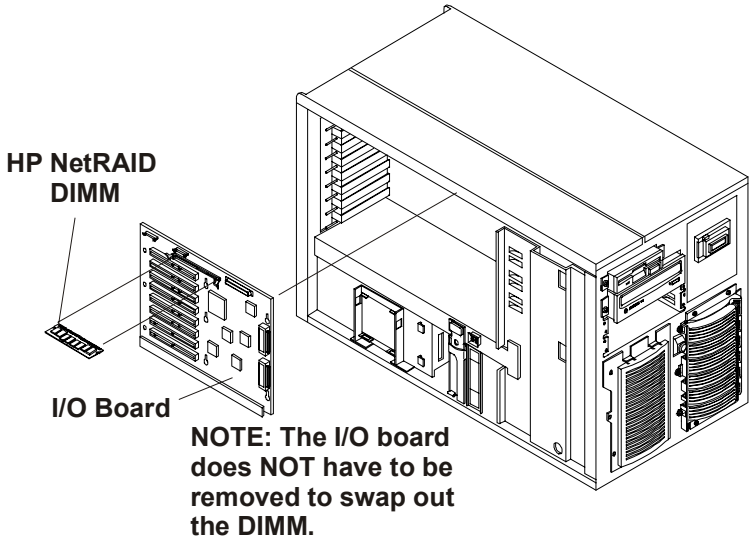
1. Log off all users. Back up files. Follow instructions in your network operating system (NOS) documentation to gracefully shut down all networking software and applications.
2. Press the power switch on the HP NetServer's control panel when prompted by the operating system.
3. Disconnect the power cords.

WARNING	The power supplies will continue to provide standby current to the NetServer until the power is disconnected.

4. If you have a rack-mounted LH 6000r, then consider removing the cables from the rear of the enclosure before extending the enclosure on the slides (if you don't have a cable management arm). If necessary, label the cables to support re-connecting them.
5. Remove the top cover (rack-mount orientation) or the left side cover (pedestal version).

CAUTION	Wear a wrist strap and use a static-dissipating work surface connected to the chassis when handling components. Ensure that the metal of the wrist strap contacts your skin.

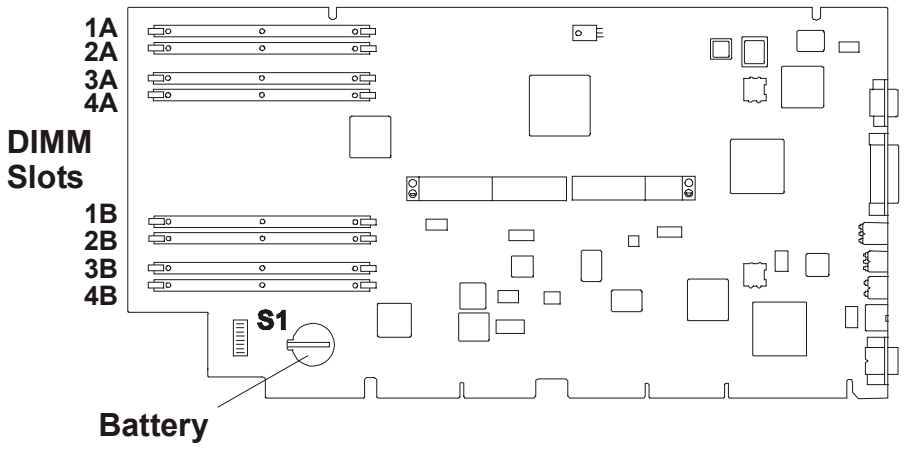
6. Locate and remove the DIMM from the I/O board.



Remove the HP NetRAID DIMM from the I/O Board

7. Replace the DIMM and reassemble the system.

Replacing the System Battery



System Board – Battery Location

The installation procedure is the same for the rack-mount and the pedestal HP NetServers once you gain access to the system board assembly.

1. Log off all users and gracefully shut down the network operating system according to directions in your NOS documentation.
2. Power down the HP NetServer.
3. Disconnect the power cords and cables, and if necessary, label each one to support re-assembly.

CAUTION	The power supplies will continue to provide standby current to the NetServer until the power cable is disconnected.

4. For both rack-mounted and pedestal models, gain access to the system board assembly.

NOTE	In the rack-mounted version, this assembly is under the right cover, in the pedestal version, it is under the top cover.

WARNING	Always disconnect the power cords before removing the covers, to avoid exposure to high energy levels that may cause burns when parts are short-circuited by metal objects such as tools or jewelry. Disconnect any telephone cables to avoid exposure to shock hazard from telephone ringing voltages.

5. Remove the two screws securing the system board assembly to the chassis.
6. Unlatch the blue retaining latches to release the assembly.
7. Pull the assembly out until it clears the chassis guides.

CAUTION	The system board assembly weighs approximately 30 lbs. Have someone help you. One person can do it, but it is easier with two.

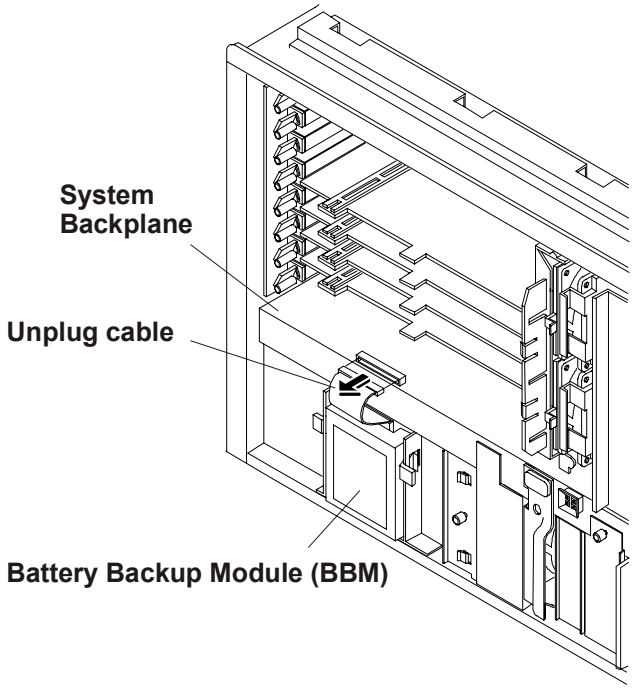
8. Slide the system board assembly from the chassis and place it metal plate side down on an anti-static pad
9. Note the polarity of the battery and the orientation of the battery in the battery holder.
10. Lift the clip holding the battery in the battery holder and remove the battery.
11. Install new the battery in the battery holder.
12. Reinstall any adapter boards you removed.
13. Carefully reinsert the system board assembly into its guides, and reseat it into its socket by rotating the blue latches to the flat, locked position.
14. Replace the two screws securing the system board assembly to the chassis.
15. Close up the HP NetServer.
16. Reconnect power cords and cables.
17. Restore HP NetServer to normal operation.

    Reset the time and date if necessary.

This completes your battery installation.

CAUTION	Dispose of the old battery in accordance with your local environmental regulations.

Replacing the NetRAID Battery Backup Module (Optional)



Battery Backup Module Location

The installation procedure is the same for the rack-mount and the pedestal HP NetServers once you gain access to the I/O side of the chassis.

1. Log off all users and gracefully shut down the network operating system according to directions in your NOS documentation.
2. Power down the HP NetServer.
3. Disconnect the power cords and cables, and if necessary, label each one to support re-assembly.

CAUTION	The power supplies will continue to provide standby current to the NetServer until the power cable is disconnected.

4. For both rack-mounted and pedestal models, gain access to the I/O side of the chassis.

NOTE	In the rack-mounted version, the I/O is under the top cover, in the pedestal version, the I/O is under the left cover.

WARNING	Always disconnect the power cords before removing the covers, to avoid exposure to high energy levels that may cause burns when parts are short-circuited by metal objects such as tools or jewelry. Disconnect any telephone cables to avoid exposure to shock hazard from telephone ringing voltages.

5. Unplug the cable from the I/O board.

6. Release the battery backup module from the chassis by pressing on both latches to release the module.
7. Pull the module out until it clears the chassis.
8. Remove the cable from the module.
9. Remove the replacement battery backup module from the shipping container.
10. Install one end of the cable to the battery backup module.
11. Install the battery backup module into the chassis bracket.
12. Connect to other end of the cable to the socket on the I/O board.
13. Close up the HP NetServer.
14. Reconnect power cords and cables.
15. Restore HP NetServer to normal operation.

This completes your battery backup module installation.

CAUTION	Dispose of the old battery in accordance with your local environmental regulations.

Replacing System Memory

CAUTION	Extend the anti-tip foot prior to any work on a rack-mount server.

The replacement procedure is the same for the rack-mount and the pedestal HP NetServers once you gain access to the system board assembly.

1. Log off all users and gracefully shut down the network operating system according to directions in your NOS documentation.
2. Power down the HP NetServer.

CAUTION	The power supplies will continue to provide standby current to the NetServer until the power is disconnected.

3. Disconnect the power cords and cables, and if necessary, label each one to support re-assembly.
4. For both rack-mounted and pedestal models gain access to the system board assembly.

NOTE	In the LH 6000r this assembly is under the right cover, in the LH 6000 it is under the top cover.

WARNING	Always disconnect the power cords before removing the covers, to avoid exposure to high energy levels that may cause burns when parts are short-circuited by metal objects such as tools or jewelry. Disconnect any telephone cables to avoid exposure to shock hazard from telephone ringing voltages.

While you can perform memory installation in the rack or in the pedestal, it is recommended that you remove the system board assembly in order to install components. If you install memory without removing the

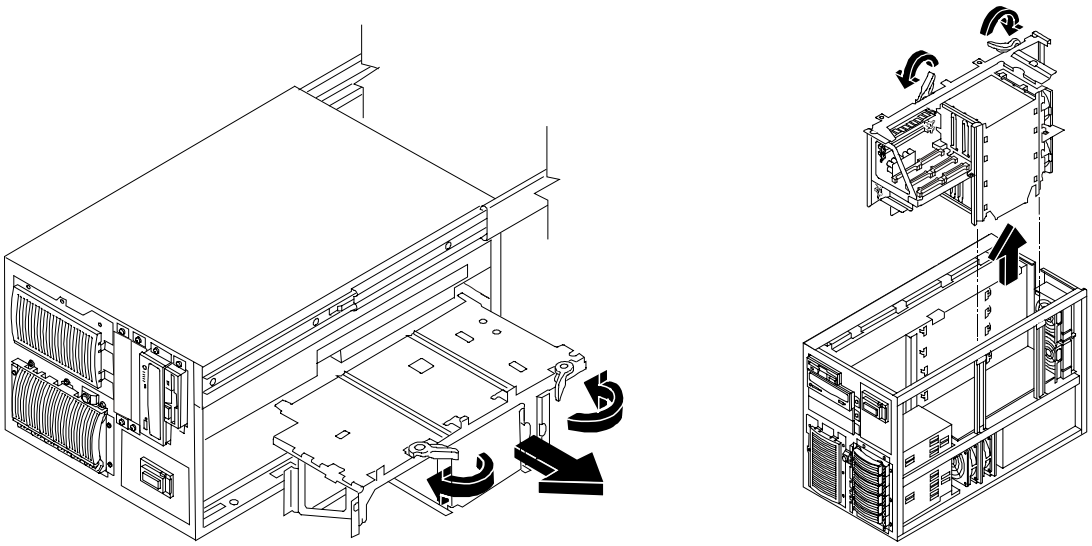
system board assembly, the DIMM slots region of the system board is accessible when the bottom cover of the LH 6000r is removed and the left cover of the LH 6000 is removed.

5. Remove the two screws securing the system board assembly to the chassis.
6. Unlatch the blue retaining latches to release the assembly.

CAUTION	Wear a wrist-strap and use a static-dissipating work surface connected to the chassis when handling components. Ensure the metal of the wrist strap contacts your skin.

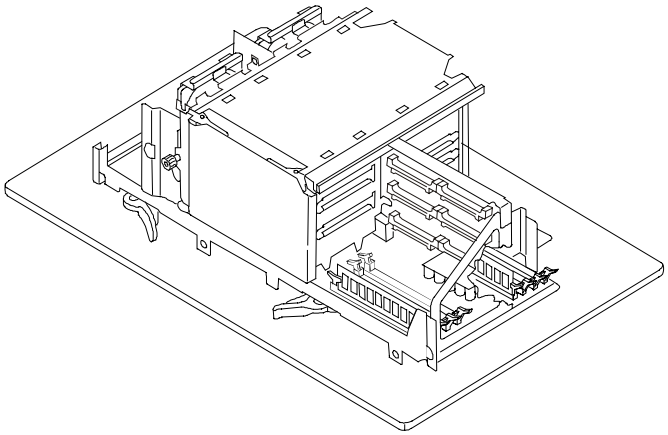
7. Pull the assembly out until it clears the chassis guides.

CAUTION	The System Board Assembly is heavy. Support it at the bottom as it is removed from the chassis.



Removing the System Board Assembly

8. Slide the system board assembly from the chassis and place it metal plate side down on an anti-static pad.



System Board Assembly on Grounded Anti-static pad

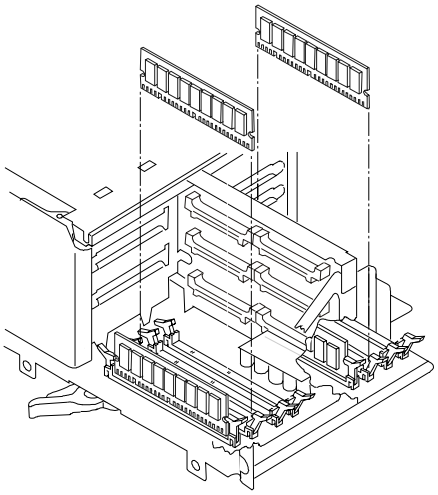
9. Identify the slot location for the DIMM being replaced.

Paired Memory Slots

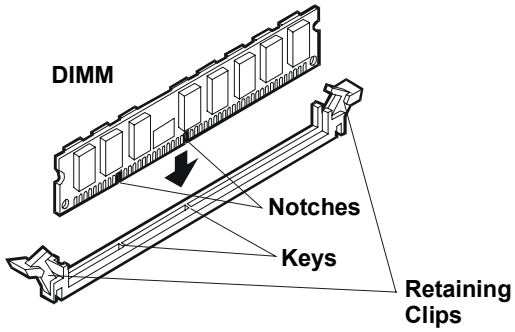
Slot 1A and Slot 1B
Slot 2A and Slot 2B
Slot 3A and Slot 3B
Slot 4A and Slot 4B

10. Remove and Replace the DIMM:
    a. Spread the latches outward on each socket receiving a DIMM.
    b. Remove a DIMM, handling the module by its edges.
    c. Align the notches on the replacement DIMM with the slot keys on the socket.
    d. Press the DIMM into the socket until the latches close.

CAUTION	*Do not rock the DIMM into place, but apply firm and even pressure.* If a gap exists between the retaining latches and the DIMM, remove the module gap.



Insert DIMMs in Matched Pairs



Align DIMM Notches with slot keys

NOTE	If the latches do not close, repeat until they do.

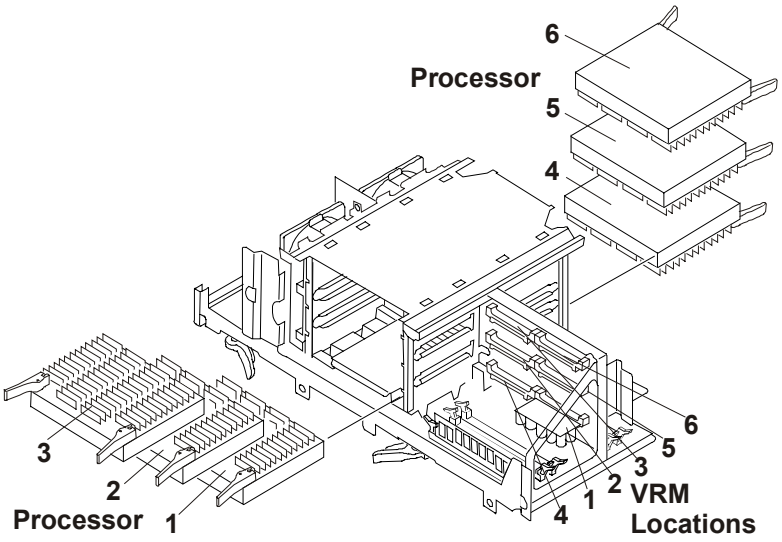
Repeat step 10 to replace any other DIMMs for the memory configuration.

11. Carefully reinsert the system board assembly into its guides, and reseat it into its socket by rotating the blue latches to the flat, locked position.
12. Replace the two screws securing the system board assembly to the chassis.
13. Close up the HP NetServer.
14. Reconnect power cords and cables.
15. Restore HP NetServer to normal operation.

This completes your DIMM installation.

Replacing a Processor

The procedure is the same for the rack-mount and the pedestal HP NetServer once you gain access to the system board assembly.

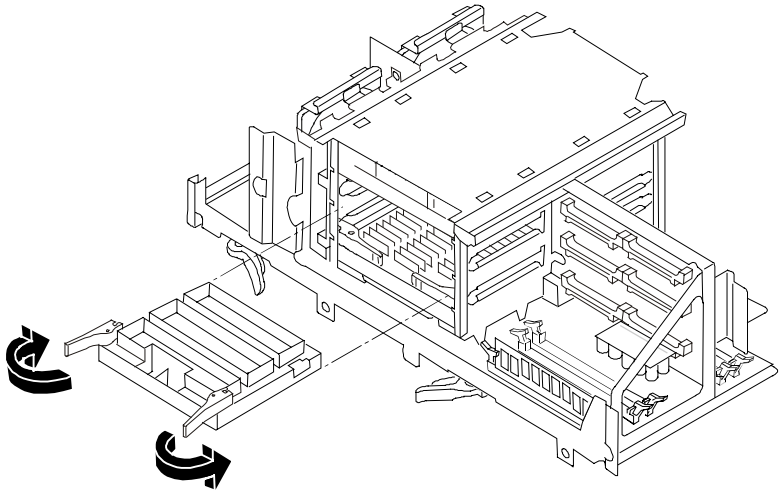


Processor and VRM Locations

1. Place the system board assembly on an anti-static pad.
2. Unpack the processor shipping box and check the contents against its packing list.

CAUTION	Do not remove the processor from its bag until you are ready to install it. Make sure the bag remains sealed.

3. Loosen the thumbscrew and open the access cover to the processor slots
4. Open the latches and remove the processor.



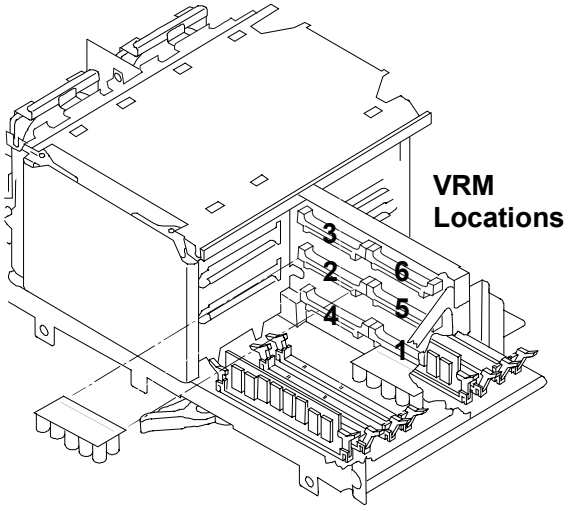
Removing a Processor Baffle/Terminator

5. Open the latches on top of the new processor
6. Align the processor being replaced over the next available slot so that the heat sink faces away from the system board for processors 1, 2, and 3 and towards the system board for processors 4, 5, and 6.
7. Gently push down on the processor being added until it is fully seated.
8. Rotate the retaining latches to seat the processor firmly in the connector.
9. Close the access cover to the processor slots and tighten the thumbscrew.

Replacing a VRM

1. Gently pull the VRM from the socket.
2. Install the new VRM by aligning the VRM with the slot.

   Note that the component side of the VRM will face toward the system board



Inserting a VRM

CAUTION	Do not touch the components as you push the VRM down into the slot.

3. Gently insert the VRM into the socket.
4. Re-install the system board assembly into the chassis.

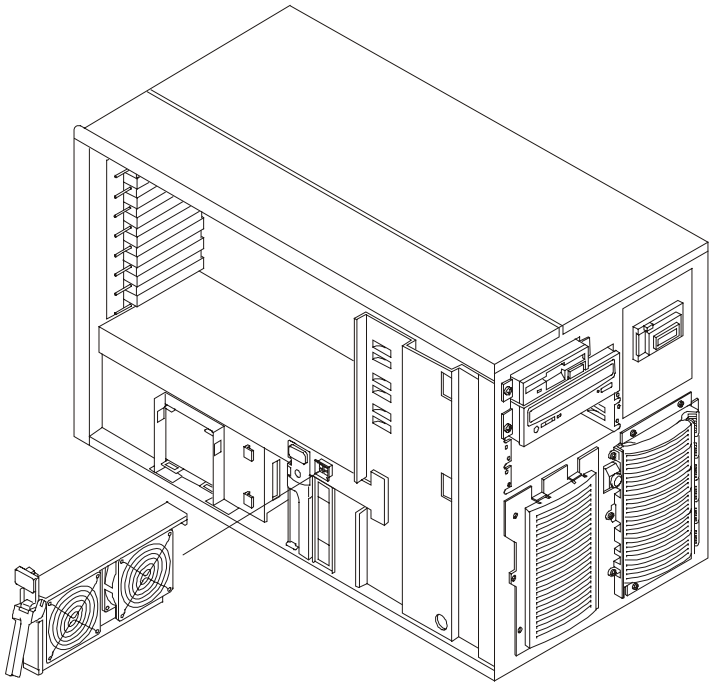
Replacing the Power Supply Fans

The power supply fans are mounted on removable brackets just forward of the power supply cage(s). Each bracket contains two fans. The fans are not individually replaceable; you must replace them both, and the bracket, as a unit. These units may be hot-swapped.

CAUTION	Do not run this NetServer for more than 60 minutes without all covers in place. Any component being replaced must be removed and a replacement installed within this 60-minute time window. If you feel that you cannot, in your estimate, replace any particular component within this time, first turn off power to the system and then replace the component. Failure to replace the covers within 60 minutes may result in damage to system components due to lack of cooling air.

Follow these instructions to remove and replace the power supply fans:

1. Back up the hard disk drive(s) and save the configuration.
2. If necessary, shutdown the network operating system.
3. Turn off the HP NetServer and display.
4. Disconnect all telephone cables and power cords.
5. Remove cover.
6. Lift the ejection handle to release the fan bracket from the chassis. Remove the bracket from the chassis.



Removing the Power Supply Fan Assembly

Install the new fan assembly by using the above procedures in reverse.

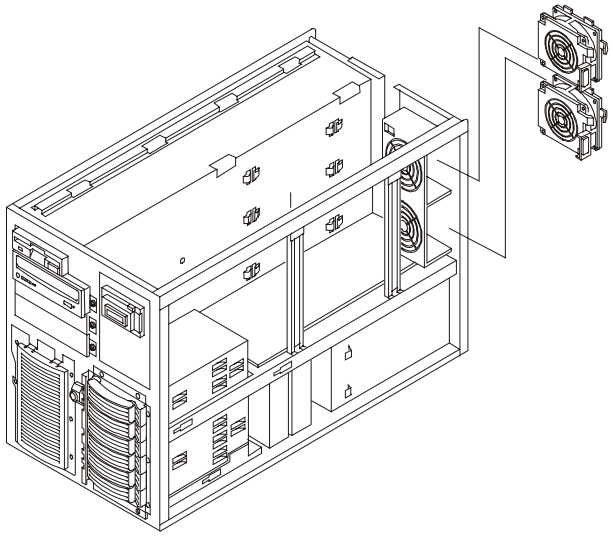
Replacing the Rear Chassis Fans

The rear chassis fans are individually mounted just to the rear of the system board assembly. These fans are individually replaceable and may be hot-swapped.

CAUTION	Do not run this NetServer for more than 60 minutes without all covers in place. Any component being replaced must be removed and a replacement installed within this 60-minute time window. If you feel that you cannot, in your estimate, replace any particular component within this time, first turn off power to the system and then replace the component. Failure to replace the covers within 60 minutes may result in damage to system components due to lack of cooling air.

Follow these instructions to remove and replace the chassis fans:

1. Back up the hard disk drive(s) and save the configuration.
2. If necessary, shutdown the network operating system.
3. Turn off the HP NetServer and display.
4. Disconnect all telephone cables and power cords.
5. Remove the side cover.
6. Remove the individual fan assembly by pressing the handles and pulling the assembly out of the chassis.



Removing a Rear Chassis Fan

Install the new fan assembly by using the above procedures in reverse.

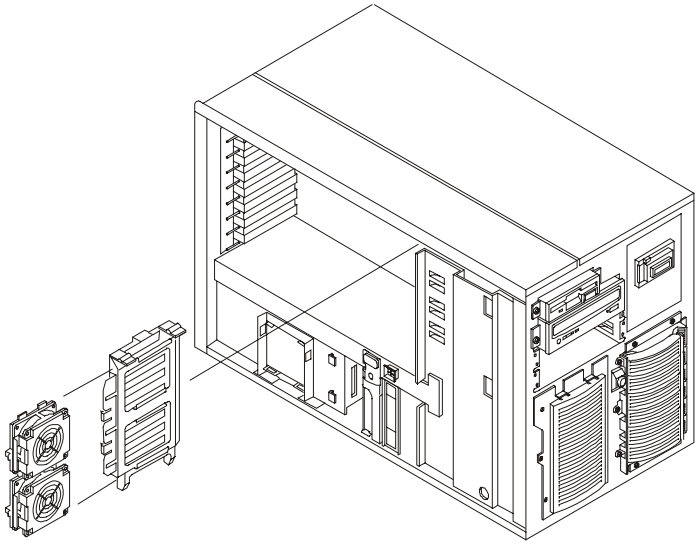
Replacing the I/O Fans

The I/O fans are mounted on the PCI board guide, just forward of the PCI sockets on the I/O board. These fans are individually replaceable and may be hot swapped.

CAUTION	Do not run this NetServer for more than 60 minutes without all covers in place. Any component being replaced must be removed and a replacement installed within this 60-minute time window. If you feel that you cannot, in your estimate, replace any particular component within this time, first turn off power to the system and then replace the component. Failure to replace the covers within 60 minutes may result in damage to system components due to lack of cooling airflow.

Follow these instructions to remove and replace the I/O fans:

1. Back up the hard disk drive(s) and save the configuration.
2. If necessary, shutdown the network operating system.
3. Turn off the HP NetServer and display.
4. Disconnect all telephone cables and power cords.
5. Remove cover.
6. Remove the fan by pressing in on the tab and sliding the fan out of the chassis (see figure below).



Removing the I/O Fans

Replace the fan by using the above procedure in reverse.

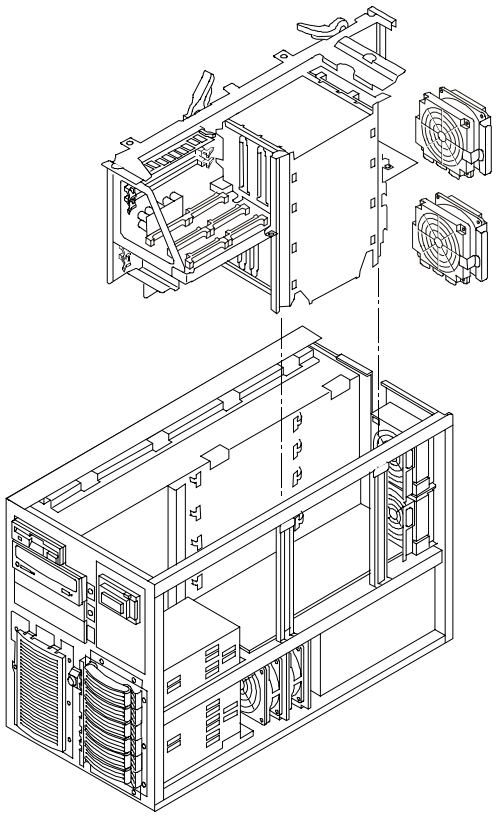
Replacing the Processor Fans

The processor fans are individually mounted just to the rear of the system board assembly. These fans are individually replacable and may be hot-swapped.

CAUTION	Do not run this NetServer for more than 60 minutes without all covers in place. Any component being replaced must be removed and a replacement installed within this 60-minute time window. If you feel that you cannot, in your estimate, replace any particular component within this time, first turn off power to the system and then replace the component. Failure to replace the covers within 60 minutes may result in damage to system components due to lack of cooling air.

Follow these instructions to remove and replace the processor fans:

1. Back up the hard disk drive(s) and save the configuration.
2. If necessary, shutdown the network operating system.
3. Turn off the HP NetServer and display.
4. Disconnect all telephone cables and power cords.
5. Remove the right side cover (HP NetServer LH 6000) or the bottom cover (HP NetServer LH 6000r).
6. Remove the individual fan assembly by pressing the handles and pulling the assembly out of the chassis.



Removing a Processor Fan

Install the new fan assembly by using the above procedures in reverse.

Replacing the Hot Swap Mass Storage Cage

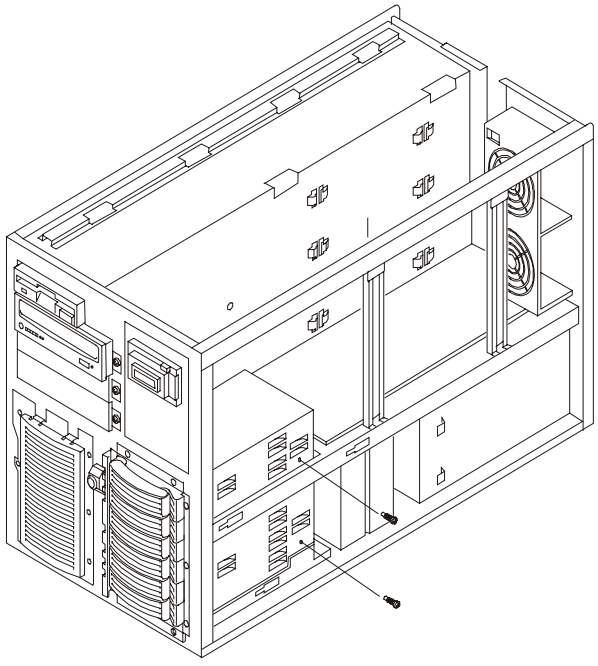
The hot-swap mass storage cage has two printed circuit boards (PCBs) mounted on the cage. In the occurrence of a failure, the entire cage, along with the PCBs, must be replaced.

To replace the cage:

1. Back up the hard disk drive(s) and save the configuration.
2. If necessary, shutdown the network operating system.
3. Turn off the HP NetServer and display.
4. Disconnect all telephone cables and power cords.
5. Remove the bezel and the appropriate cover(s).
6. Unlock the mass storage cage lock.
7. Remove all disk modules from the hot-swap cage.

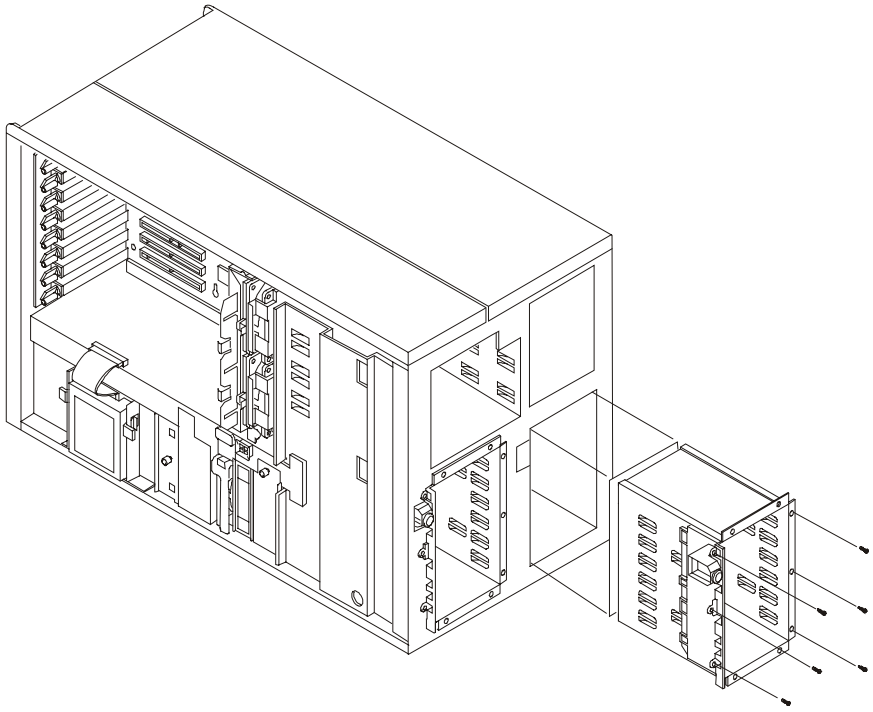
CAUTION	Note and mark the order of the installed hard disk drive modules in the hot swap cage so that you install them later in the exact same order. Failure to do this may result in serious data-corruption problems.

8. Disconnect all power cords and cables from the hot-swap drive cage.
9. Remove the two screws (accessible after removing the appropriate cover and air baffle) securing the side of the cage to the chassis.



Remove cage mounting screws

10. Remove the six screws securing the cage to the front of the chassis.



Remove cage mounting screws

11. Slide the cage out of the chassis. Install the new cage by reversing the removal procedure.

Replacing the I/O Board

The procedure is the same for the rack-mount and the pedestal HP NetServers once you gain access to the I/O board.

1. Log off all users and gracefully shut down the network operating system according to directions in your NOS documentation.
2. Power down the HP NetServer.
3. Disconnect the power cords and cables, and if necessary, label each one to support re-assembly.

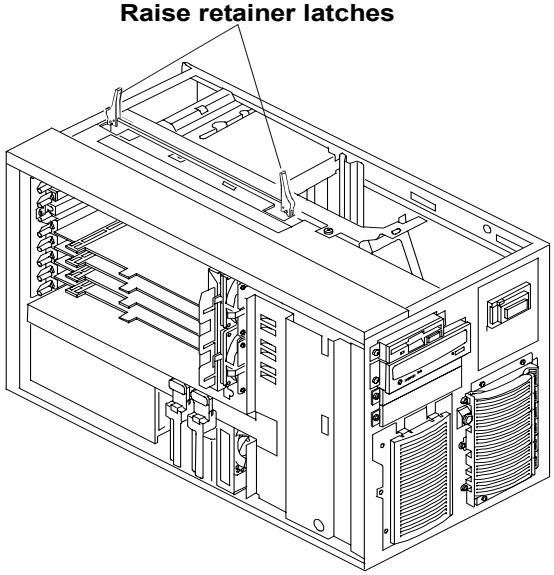
CAUTION	The power supplies will continue to provide standby current to the NetServer until the power is disconnected.

4. For both rack-mounted and pedestal models, gain access to the I/O board.

NOTE	In the rack-mounted version, this board is under the top cover, in the pedestal version, it is under the left cover.

WARNING	Always disconnect the power cords before removing the covers, to avoid exposure to high energy levels that may cause burns when parts are short-circuited by metal objects such as tools or jewelry. Disconnect any telephone cables to avoid exposure to shock hazard from telephone ringing voltages.

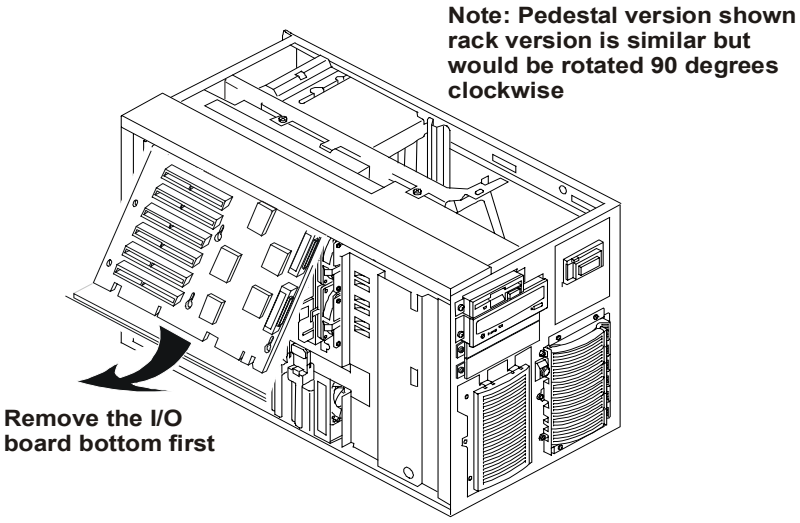
5. Remove the two I/O fans.
6. Remove the front board hold-down.
7. Remove all PCI boards.
8. Remove the PCI board guide.
9. Disconnect all cables from the I/O board.
10. Remove the 3 screws at the rear of the I/O board that secure it to the chassis.
11. Eject the I/O board from the socket in the Power Management/Interconnection board by rotating the retaining latches until they point away from the chassis.



Note: Pedestal version shown, rack version would be rotated 90 degrees clockwise

Disconnecting the I/O Board

12. Angle the I/O board, edge connector first, out of the chassis and remove it.


Note: Pedestal version shown rack version is similar but would be rotated 90 degrees clockwise
Remove the I/O board bottom first

Removing the I/O Board

To install the I/O Board:

1. Angle the I/O Board, ejector latches first, into the chassis until the ejector latches protrude from the chassis.
2. Insert the I/O board edge connector into the socket on the Power Management/Interconnection board.
3. Rotate the retaining latches while guiding the I/O board into the connector on the Power Management/Interconnection board. When the latches are flush with the edge of the chassis, the I/O board is seated.
4. Install the 3 screws that secure the I/O board to the chassis.
5. Connect all cables to the I/O board.
6. Install the PCI board guide.
7. Install the PCI boards.
8. Install the front board hold-down.
9. Close up the server.
10. Reconnect power cords and cables.
11. Restore HP NetServer to normal operation.

This completes your I/O board installation.

Replacing the Processor Board

The procedure is the same for the rack-mount and the pedestal HP NetServers once you gain access to the system board assembly.

1. Log off all users and gracefully shut down the network operating system according to directions in your NOS documentation.
2. Power down the HP NetServer.
3. Disconnect the power cords and cables, and if necessary, label each one to support re-assembly.

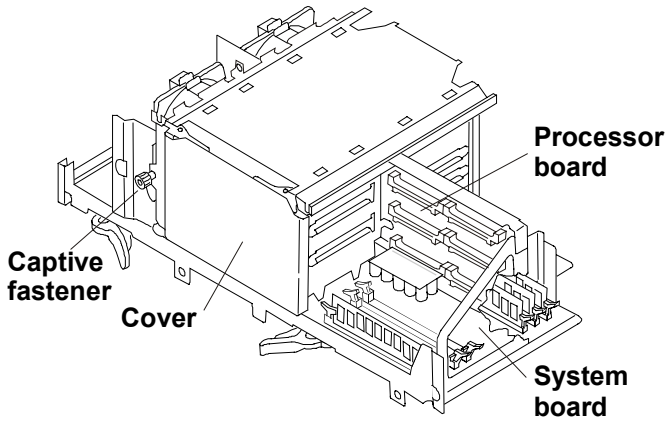
CAUTION	The power supplies will continue to provide standby current to the NetServer until the power is disconnected.

4. For both rack-mounted and pedestal models, gain access to the system board assembly.

NOTE	In the rack-mounted version, this assembly is under the right side lower cover, in the pedestal version, it is under the top right cover.

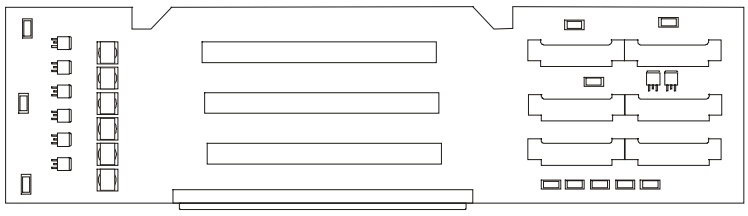
WARNING	Always disconnect the power cords before removing the covers, to avoid exposure to high energy levels that may cause burns when parts are short-circuited by metal objects such as tools or jewelry. Disconnect any telephone cables to avoid exposure to shock hazard from telephone ringing voltages.

5. Access the system board assembly.



System Board Assembly showing System and Processor Boards

The processor board is mounted on the system board.



Processor Board

To access the processor board for replacement of the part, it is necessary to disassemble the entire system board assembly.

1. Remove the Processor fans
2. Remove the Processor cage covers – Undo the thumbscrew and lift the cover away from the cage
3. Remove the Processor and Terminator assemblies. Note positions of processors and terminators for reinstallation.
4. Remove the fan guides, upper and lower – remove two screws on each guide
5. Remove the Processor cage support – remove two screws and slide the support upward releasing the four tabs from the slots on the cages

6. Remove the Processor board assembly from the system board assembly – remove ten screws – eight at base of Processor Cages, four upper and four lower, and two at stiffener/strut.
7. Remove the VRMs. Note positions of the DIMMs for reinstallation.
8. Remove the Processor Cage – Upper and lower – remove four screws each cage
9. Remove the Processor board stiffener/strut – remove two screws
10. Replace the Processor board with the new Processor board.
11. Reinstall the VRMs
12. Reassemble the System Board Assembly.

Replacing the System Board

The procedure is the same for the rack-mount and the pedestal HP NetServers once you gain access to the system board assembly.

1. Log off all users and gracefully shut down the network operating system according to directions in your NOS documentation.
2. Power down the HP NetServer.
3. Disconnect the power cords and cables, and if necessary, label each one to support re-assembly.

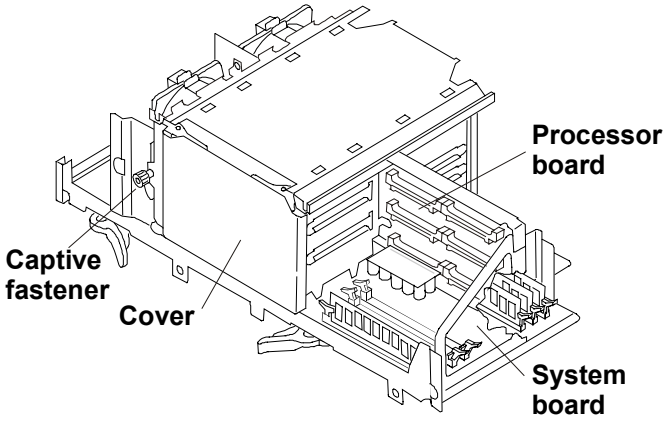
CAUTION	The power supplies will continue to provide standby current to the NetServer until the power is disconnected.

4. For both rack-mounted and pedestal models, gain access to the system board assembly.

NOTE	In the rack-mounted version, this assembly is under the right side lower cover, in the pedestal version, it is under the top right cover.

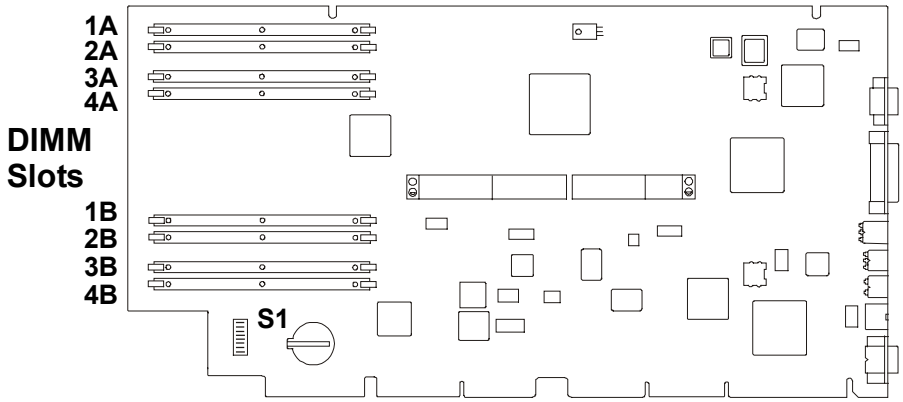
WARNING	Always disconnect the power cords before removing the covers, to avoid exposure to high energy levels that may cause burns when parts are short-circuited by metal objects such as tools or jewelry. Disconnect any telephone cables to avoid exposure to shock hazard from telephone ringing voltages.

5. Access the system board assembly.



System Board Assembly showing System and Processor Boards

The system board provides the base support for the processor board.



System Board

NOTE	The system board includes a metal carrier tray. Do not remove the tray.

To access the system board for replacement of the part, it is necessary to disassemble the entire system board assembly.

1. Remove the Processor fans
2. Remove the Processor cage covers – Undo the thumbscrew and lift the cover away from the cage
3. Remove the Processor and Terminator assemblies. Note positions of processors and terminators for reinstallation.
4. Remove the fan guides, upper and lower – remove two screws on each guide
5. Remove the Processor cage support – remove two screws and slide the support upward releasing the four tabs from the slots on the cages
6. Remove the Processor board assembly from the system board assembly – remove ten screws – eight at base of Processor Cages, four upper and four lower, and two at stiffener/strut

7. Remove the DIMMs. Note positions of the DIMMs for reinstallation.
8. Record the configuration switch settings for setting the replacement system board.
9. Replace the system board with the new system board.
10. Set the configuration switches
11. Reassemble the System Board Assembly.
12. Reset the time and date if necessary.

Replacing the Power Management/Interconnect Board

The replacement procedure is the same for the rack-mount and the pedestal HP NetServers once you gain access to the Power Management/Interconnection board.

1. Log off all users and gracefully shut down the network operating system according to directions in your NOS documentation.
2. Power down the HP NetServer.
3. Disconnect the power cords and cables, and if necessary, label each one to support re-assembly.

CAUTION	The power supplies will continue to provide standby current to the NetServer until the power is disconnected.

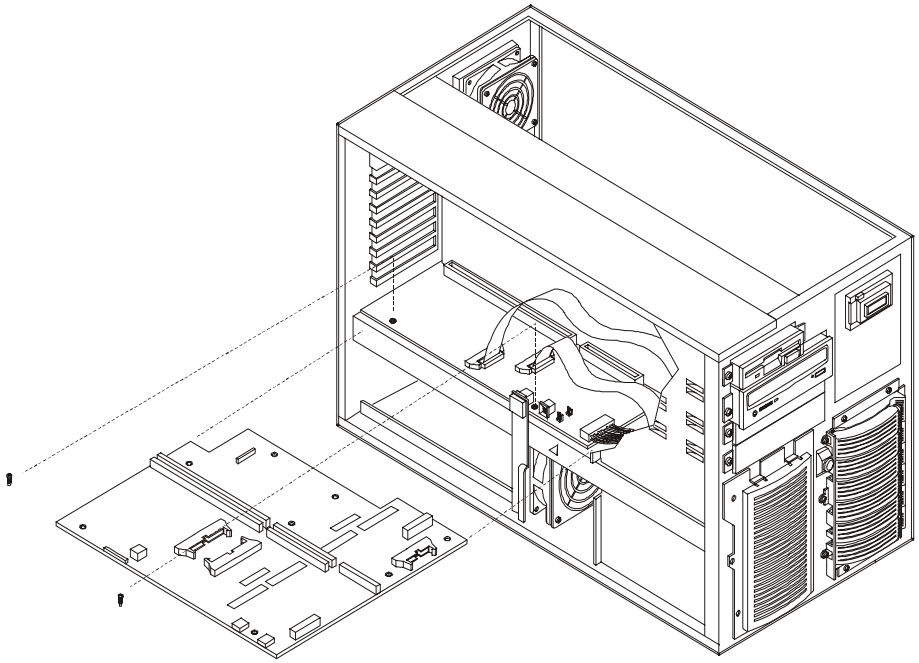
4. For both rack-mounted and pedestal models, gain access to the Power Management/Interconnection board.

WARNING	Always disconnect the power cords before removing the covers, to avoid exposure to high energy levels that may cause burns when parts are short-circuited by metal objects such as tools or jewelry. Disconnect any telephone cables to avoid exposure to shock hazard from telephone ringing voltages.

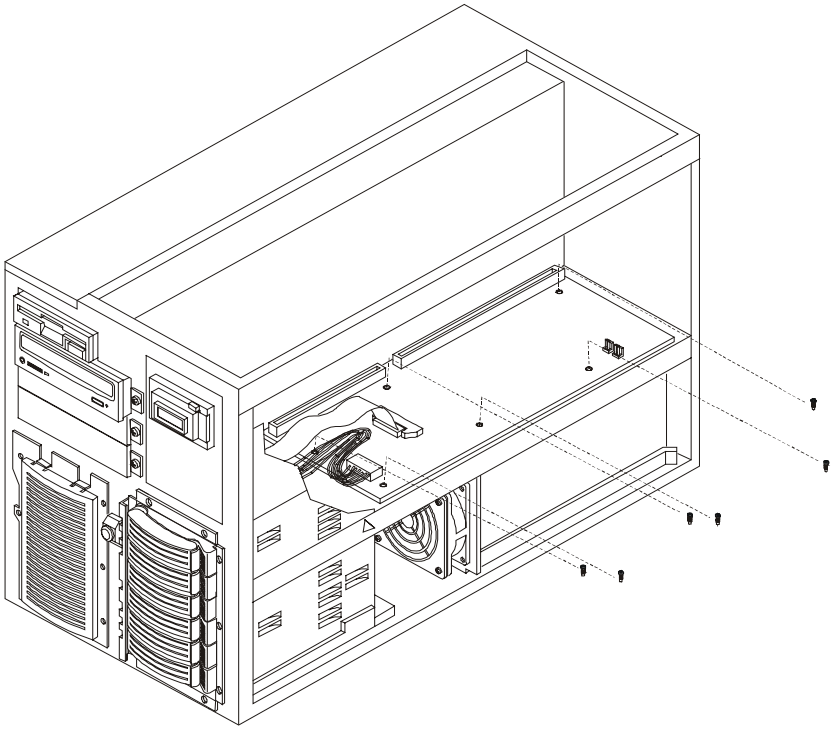
5. Remove the rear chassis fans.
6. Remove the power supply fans.
7. Remove the accessory fans.
8. Remove the System Board Assembly.
9. Remove the I/O Board.
10. Remove all cables connecting to the Power Management/Interconnection board (see figures, below).

NOTE	Cables are connected to both the bottom and top of the Power Management/Interconnection board. Be sure to disconnect all cables before removing the Power Management/Interconnection board.

11. Remove the eight screws holding the Power Management/Interconnection board to the chassis (see figures).



Power Management/Interconnection Board Access – Left Side/Top



Power Management/Interconnection Board Access – Right Side/Bottom

12. Lift up the Power Management/Interconnection board and gently slide it sideways out of the chassis.

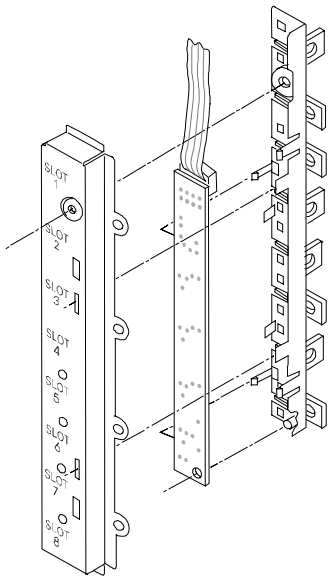
Install the replacement Power Management/Interconnection board using the above procedure in reverse.

Replacing the PCI Hot-Swap Assembly

The Olx board is mounted within the slot cover on the rear of the HP NetServer. To access the Olx board it is necessary to remove the slot cover from the rear panel.

1. Remove the two screws mounting the cover to the rear panel.
2. Access the interior and disconnect the Olx cable from the I/O board.
3. Remove the Olx circuit board from the housing by moving the two tabs that fit over the board and hold it to the housing.

   Install the replacement board by aligning it component side toward the housing and aligning the mounting hole on the board to the post on the housing. The board will then snap into place.



Hot-Swap Board Assembly

Index

1
12V Fault, 13

2
256 Colors, 26

3
3D Video Modes, 26

A
accessory board
  guidelines, 23
acetone, 55
Acoustic Emissions, 27
activity LED
  hard disk drive, 12
Activity LED, 76
Adjust Contrast, 14
Advanced Programmable Interrupt Controller
  APIC, 17
altitude, 27
Amber Attention LED
  PCI, 13
ammonia, 55
anti-static wrist strap, 79
anti-tip foot, 3
APIC, 17
arrows
  front panel, 15

B
Battery Backup Module
  replacing, 84
Beep Codes, 47
benzene, 55
bezel
  removing, 1
BIOS Recovery, 60
Boot Block, 29
boot order, 17
boot priority, 17

C
Cables and Part Numbers, 41
Cabling Diagram, 41
Caution
  light pipes, 77
CD-ROM
  eject hole, 65
  LEDs, 12
  problems, 65
chassis guides, 8
CLEAR CONFIG, 58
  use, 58
Clear Configuration, 29
Clear Password, 29
component failure, 11
Component Info, 14
configuration
  clearing, 57
configuration switch
  S1, 28
configuration switches
  S5-S8, 29
Connector Pinouts, 17
control panel
  lock, 11
  replacing, 80
cover
  illustration, 3
  removing LH6000r, 3
covers
  removing LH6000, 1
Covers, Bezel, Front Panel, 33

D
DC Power Switch, 11
depth
  system, 28
Diagnostic Tests, 43
diagnostics, 43
DiagTools, 44
dimensions, 27
DIMMs, 21
disk array controllers, 24
Down Arrow
  front panel, 15
Drive Failure Predicted, 13
Drive Fault, 13
dual-channel RAID controller, 24

E
Enter
  front panel, 15
Error Messages, 48
Escape
  front panel, 15
Event Log menu
  location, 15
Event Log Menu
  using, 45
exploded view
  Covers, Bezel, Front Panel, 33
  Exhaust Fans, 37

Mass Storage, 35
Power Supply, I/O Board, Fans, 34
System Board Assembly, 36
External SCSI (Wide) LVD Cable, 41

F
fans
replacing I/O, 92
replacing power supply, 90
replacing Rear Chassis, 91
Flexible Disk Cable, 41
Flexible disk drive
boot priority, 17
Flexible Disk Drive
LEDs, 12
Problems, 66
front panel, 9
arrows, 15
Front Panel Console Switch, 11
front view, 9
FW Info, 14

G
Green LED, 14

H
hard disk drive
LED indicators, 12
height
system, 27
Hot Plug PCI Boards, 23
Hot Swap Mass Storage Cage
replacing, 94
Hot-swap disk drive module, 76
hot-swap mass storage
cage, 22
primary, 22
HP NetRAID controller
boot priority, 17
HP NetRAID DIMM
replacing, 81
HP NetServer Assistant, 61
humidity, 27

I
I/O board
illustration, 31
I/O Board
replacing, 95
IDE CD-ROM, 22
IDE CD-ROM Cable, 41
IDE CD-ROM drive
boot priority, 17
Indicators, LED, 76
Information Assistant Documentation CD-ROM, 1
Input voltages, 28
interleaved memory, 21
Internal SCSI (Wide) LVD Cable, 41
Internal SE SCSI Cable, 41
IRQs, 17

K
key
bezel, 1
Key, 41
keyboard
lock, 11
problems, 67
Keyboards, 41

L
LAN
LEDs, 14
LAN
Connector, 21
LEDs, 76
rear, 13
Left Arrow
front panel, 15
light pipes, 13
hot-swap drives, 12
Light pipes, LED, 77
lighter fluid, 55
Locking Latch, 6
lost clusters, 66
low voltage differential. *See* LVD
LpA, 27
LVD SCSI, 70

M
Main Menu, 14
maintenance, 55
mass storage, 22
Mass Storage Guidelines, 22
memory
guidelines, 21
interleaved, 21
problems, 64
Mini-DIN
Connectors, 20
mouse
problems, 67

N
NetRAID
guidelines, 24
technology, 24
NetRAID Assistant, 25
Network Interface Card, 67
problems, 67
NIC, 67
problems, 67

O
OIx board, 103

P
parallel port
connector, 19
Parts Information, 33
Parts List, 38
password
clear, 29
Password Problems, 59
PCI Attention LEDs, 13
PCI boards
boot priority, 17
PCI Hot-Swap Assembly
replacing, 103
PCI LED
amber, 13
green, 13
PCI slot, 13
pinouts, 17
POST Routines, 46
power, 28
availability, 28
problems, 68
Power Cords, 41
Power Management/Interconnect Board
replacing, 101
Power Management/Interconnection board, 32
power supply
LEDs, 14
replacing, 79
Specifications, 28
Power-On Self-Test "POST", 43
pre-failure condition, 11
preventive maintenance, 55
Primary Mass Storage Power Cable, 41
printer/datacomm
problems, 78
processor
problems, 77
replacing board, 97
Processor
replacing, 88
Processor Fans
replacing, 92

R
RAID array, 25
RAID channel, 24
read/write errors, 66
rear
LEDs, 13
rear view, 10
Remote Control board, 24
Remote Management Cable, 41
Replaceable Parts List, 38
Reset
switch, 11
resolution
video, 26
retaining latches, 7
Right Arrow
front panel, 15
RJ-45 connection, 14

S
SCSI
internal controller, 70
Subsystem Problems, 69
SCSI A channel, 24
SCSI Configuration Utility, 71
SCSI port
connector 50 pin, 19
SCSI Port
connector 50 pin narrow, 19
Secondary Mass Storage, Non-Hot-Swap Device,, 41
Secure Mode Indicator, 11
serial port
connector, 18
Service, 14
Setup utility
boot priority, 17
SGRAM, 26
single-ended SCSI devices, 70
size, 27
sound level, 27
specification, 26
standby power, 1
Status LED, 76
status screen, 11
switch settings, 28
System Battery
replacing, 82
system board
illustration, 30
replacing, 99
system board assembly
gaining access, 59
illustration, 30
removing, 7, 8
weight, 8
System Info, 14
system information, 15
System Memory
replacing, 85

T
tape heads, 55
telephone cables, 7
temperature, 27
third-party components, 61
tools, 79
Top Tools
board, 24
TopTools, 61

transfer rate
SCSI, 70
trichlorethylene, 55
troubleshooting, 55
Troubleshooting Checklist, 61

U
Ultra2 hard disk drive modules, 76
Ultra2 SCSI, 70
Ultra-2 SCSI, 22
Up Arrow
front panel, 15

V
VAC, 28
video
3D Video Modes, 26
connector pinouts, 17
memory, 26
Video/Monitor Problems, 73
Volt/Amps, 28
voltage, 28
VRM
replacing, 89

W
Watts, 28
weight
system, 28
Weight and Dimensions, 27
width
system, 27

Z
Z-bracket, 5